ECM-MTL

Intel® Core™ Ultra 5 Processor 125U 125H 3.5” Micro Module

User’s Manual

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Revision	Date	By	Comment
1st	March 2025	Avalue	Initial Release

Declaration of Conformity



This device complies with part 15 fcc rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a class "a" digital device, pursuant to part 15 of the fcc rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE statement

The product(s) described in this manual complies with all application European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

Notice

This guide is designed for experienced users to setup the system within the shortest time. For detailed information, please always refer to the electronic user's manual.

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Disclaimer

This manual is intended to be used as a practical and informative guide only and is subject to change without notice. It does not represent a commitment on the part of Avalue. This

product might include unintentional technical or typographical errors. Changes are periodically made to the information herein to correct such errors, and these changes are incorporated into new editions of the publication.

A Message to the Customer

Avalue Customer Services

Each and every Avalue's product is built to the most exacting specifications to ensure reliable performance in the harsh and demanding conditions typical of industrial environments. Whether your new Avalue device is destined for the laboratory or the factory floor, you can be assured that your product will provide the reliability and ease of operation for which the name Avalue has come to be known.

Your satisfaction is our primary concern. Here is a guide to Avalue's customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

Technical Support and Assistance

1. Visit the Avalue website at https://www.avalue.com/ where you can find the latest information about the product.
2. Contact your distributor or our technical support team or sales representative for technical support if you need additional assistance. Please have following information ready before you call:

- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

To receive the latest version of the user's manual; please visit our Web site at:
www.avalue.com

Product Warranty (Returns & Warranties policy)

1. Purpose

Avalue establishes the following maintenance specifications and operation procedures for providing the best quality of service and shortened repair time to our customers.

2. Warranty

2.1 Warranty Period

Avalue endeavors to offer customers the most comprehensive post-sales services and protection; besides offering a 2-year warranty for standard Avalue products, an extended warranty service can also be provided based on additional request from the customer. Within the warranty period, customers are entitled to receive comprehensive and prompt repair and warranty.

Standard products manufactured by Avalue are offered a 2-year warranty, from the date of delivery from Avalue. For ODM/OEM products manufactured by Avalue or PCBA with conformal coating, will follow up the define warranty of the agreement, otherwise will be offered 1-year warranty for ODM/OEM products but non-warranty for PCBA with conformal coating. For outsourcing parts kit by Avalue (ex: Motherboard, LCD touch panel, CPU, RAM, HDD) are offered a 6-month warranty, and Mobile/Tablet PC battery are offered a warranty of the half year, from the date of delivery by Avalue. Products before the mass production stage, i.e. engineering samples are not applied in this warranty or service policy. For extended warranty and cross-territory services, product defects resulting from design, production process or material are covered by the pre-set warranty period after the date of delivery from Avalue. For non-Avalue products, the product warranty and repair time shall be based on the service standards provided by the original manufacturer; in principle Avalue will provide these products a warranty service for no more than one year.

2.2 Maintenance services within the warranty period

In the case of Avalue product DOA (Defect-on-Arrival) when the customer finds any defect within 1 month after the delivery, Avalue will replace it with a new product in a soonest way. Except for custom products, once the customer is approved of a Cross-Shipment Agreement, which allows for delivery a new product to the customer before receiving the defective one, Avalue will immediately proceed with new product replacement for the said DOA case. On validation of the confirmed defect, Avalue is entitled to reserve the right whether to provide a new product for replacement. For the returned defective new product, it is necessary to verify that there shall be no bruise, alteration, scratch or marking to the appearance, and that none of the delivered accessories missing; otherwise, the customer will be requested to pay a processing fee. On the other hand, if the new product defect is resulting from incorrect configuration or erroneous use by the user instead of any problem of the hardware itself, the customer will also be requested to pay for relevant handling fees.

As for other conditions, Avalue will handle defects by way of repair. The customer will be requested to send the defective product to an Avalue authorized service center, and Avalue will return the repaired product back to the customer as soon as possible.

2.3 Ruling of an out-of-warranty defect

The following situations are not included in the warranty:

- The warranty period has expired.
- Product has been altered or its label of the serial number has been torn off.
- Product functionality issues resulting from improper use by the user, unauthorized dismantle or alteration, unfit operation environment, improper maintenance, accident or other causes. Avalue reserves the right for the ruling of the aforementioned situations.
- Product damage resulting from lightning, flood, earthquake or other calamities.
- The warranty rules of non-Avalue products and accessories shall be in accordance with standards set up by the original manufacturer. These products and accessories include RAM, HDD, FDD, CD-ROM, CPU, FAN, etc.
- Product upgrade request or test request submitted by the customer after expiration of the warranty.
- PCBA with conformal coating.
- Avalue semi-product and outsourced products without Avalue serial number.
- Products before the mass production stage, i.e. engineering samples.

3. Procedure for sending for repair

3.1 Attain a RMA number

A customer's rejected product returned for repair shall have a RMA (Return Merchandise Authorization) number. Without a RMA number, Avalue will not provide any repair service for the rejected product, and the product will be returned to the customer at customer's cost. Avalue will not issue any notice for the return of the product.

Each returned product for repair shall have a RMA number, which is simply the authorization of the return for repair; it is not a guarantee that the returned goods can be repaired or replaced. For applying for a RMA number, the customer may enter the eRMA webpage of Avalue https://www.avalue.com/en/member and log-in with an account number and a password authorized by Avalue. The system will then automatically issue a RMA number.

When applying for the RMA number, it is essential to fill in basic information of the customer and the product, together with detailed description of the problem encountered. If possible, avoid using ambiguous words such as "does not work" or "problematic". Without a substantial description of the problem, it is hard to start the repair and will cause prolonged repair time. Lacking detailed statement of fault steps also makes the problem hard to be identified, sometimes resulting in second-time repairs.

In case the customer can't define the cause of problem, please contact Avalue application engineers. Sometimes when the problem can be resolved even before the customer sends back the product.

On the other hand, if the customer only returns the key parts to Avalue for repair, it is necessary that the serial number of the entire unit is given in the "Problem Description" field, so that warranty period can be ruled accordingly; or Avalue will handle the case as an Out-of- warranty case.

3.2 Return of faulty product for repair

It is recommended that the customer not to return the accessories (manual, connection cables, etc.) with the products for repair, devices such as CPU, DRAM, CF memory card, etc., shall also be removed from the faulty goods before return for repair. If these devices are relevant to described repair problems and necessary to be returned with the goods; please clearly indicate the items included in the eRMA application form. Avalue shall not be responsible for any item that is not itemized. Moreover, make sure the problem(s) are detailed in the "Problem Description" field.

In the list of delivery, the customer may fill-in a value which is lower than the actual value, to prevent customs levying a higher tax over the excessive value of the return goods. The customer shall be held responsible for extra fees caused by this. We strongly recommend that "Invoice for customs purpose only with no commercial value" be indicated on the delivery note. Also for the purpose of expedited handling, please printout the RMA number and put it in the carton, also indicate the number outside of the carton, with the recipient addressing to Avalue RMA Department.

When returning the defective product, please use an anti-static bag or ESD material to pack it properly. In case of improper packing resulting in damages in the transportation process, Avalue reserves the right to reject the un-repaired faulty good at the customer's costs. Furthermore, it is suggested that the faulty goods shall be sent via a door-to-door courier service. The customer shall be held responsible for any customs clearance fee or extra expenses if Air-Cargo is used for the delivery.

In case of a DOA situation of a new product, Avalue will be responsible for the product and the freight. If the faulty goods are within the warranty period, the sender will take responsibility for the freight. For an out-of-warranty case, the customer shall be responsible for the freight of both trips.

3.3 Maintenance Charge

Avalue will charge a moderate repair fee for the following conditions:

- The warranty period has expired.
- Product has been altered or its label of the serial number has been torn off.
- Product functionality issues resulting from improper use by the user, unauthorized dismantle or alteration, unfit operation environment, improper maintenance, accident

or other causes. Avalue reserves the right for the ruling of the aforementioned situations.

- Product damage resulting from lightning, flood, earthquake or other calamities.
- The warranty rules for non-Avalue products and accessories shall be in accordance with standards set up by the original supplier. These products and accessories include RAM, HDD, FDD, CD-ROM, CPU, FAN, etc.
- Product upgrade request or test request submitted by the customer after expiry of the warranty.
- PCBA with conformal coating.
- Avalue semi-product and outsourced products without Avalue serial number
- Products before the mass production stage, i.e. engineering samples.
- In case the products received are examined as NPF (No Problem Found) within the warranty period, the customer shall be responsible for the freight of both trips.
- Please contact your local distributor to examine in advance to prevent unnecessary freight cost.

For system failure of out-of-warranty products, Avalue will provide a quotation prior to repair service. When the customer applies for the cost, please refer to the Quotation number. In case the customer does not return the DOA product that has already been replaced by a new one, or the customer does not sign back the quotation of the out-of-warranty maintenance, Avalue reserves the right of whether or not to provide the repair service. In case the customer does not reply in 3 months, Avalue shall directly scrap or return the product back to customer at customer's cost without further notice to the customer.

3.4 Maintenance service of phased-out products

For servicing phased-out products, Avalue provides an extended period, starting the date of phase-out, as a guaranteed maintenance period of such products, for continuance of the maintenance service to meet customer's requirements. In case of unexpected factors causing Avalue to be unable to repair/replace a warranted but phased-out product, Avalue will, depending on the availability, upgrade the product (free of charge with continued warranty period as of the original product), or, give partial refund (based on the length of the remaining warranty period) to solve this kind of problem.

3.5 Maintenance Report

On completion of repair of a defective product, a Maintenance Report indicating the maintenance result and part(s) replaced (if any) will be sent to the customer together with the product. If the customer demands an additional maintenance analysis report, a service fee of various level will be charged depending on the warranty status. In case the analysis result shows that the defect attributes to Avalue's faulty design or process, the analysis fee will be exempted.

4. Service Products

Avalue provides service products to manage with different customer needs. Should you have any need, please consult to Avalue Sales Department.

Defect Analysis Report (DAR)

Avalue provides DAR (Defect Analysis Report) services aiming to elevating customer satisfaction. A DAR includes defect cause identification/verification/suggestion and improvement precautions, with instructions on correct usage for the avoidance of any reoccurrence.

Upgrade Service

Avalue is capable to provide system upgrade service for customization requirements. This upgrade service is applicable for main parts, such as CPU, memory, HDD, SSD, storage devices; also replacements motherboards of systems. Please contact Avalue sales for details to evaluate the possibility of system upgrade service and obtain information of lead time and price.

Safety Instructions

Safety Precautions

Before installing and using this device, please note the following precautions.

1. Read these safety instructions carefully.
2. Keep this User's Manual for future reference.
3. Disconnected this equipment from any AC outlet before cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
8. Use a power cord that has been approved for using with the product and that it matches the voltage and current marked on the product's electrical range label. The voltage and current rating of the cord must be greater than the voltage and current rating marked on the product.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to

avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel. If one of the following situations arises, get the equipment checked by service personnel:

- The power cord or plug is damaged.
- Liquid has penetrated into the equipment.
- The equipment has been exposed to moisture.
- The equipment does not work well, or you cannot get it work according to the user's manual.
- The equipment has been dropped and damaged.
- The equipment has obvious signs of breakage.

14. CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.
15. Equipment intended only for use in a RESTRICTED ACCESS AREA.

Explanation of Graphical Symbols

	Warning	A WARNING statement provides important information about a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Caution	A CAUTION statement provides important information about a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to the user or patient or in damage to the equipment or other property.
	Note	A NOTE provides additional information intended to avoid inconveniences during operation.
		Direct current.
		Alternating current
		Stand-by, Power on
		FCC Certification
		CE Certification
		Follow the national requirements for disposal of equipment.
		Stacking layer limit
		This side up

		Fragile Packaging
		Beware of water damage, moisture-proof
		Carton recyclable
		Handle with care
		Follow operating instructions of consult instructions for use.

Disposing of your old product

WARNING:
There is danger of explosion if the battery is mishandled or incorretly replaced. Replace only with the same type of battery. Do not disassemble it or attempt to recharge it outside the system. Do not crush, puncture, dispose of in fire, short the external contacts, or expose to water or ther liquids. Dispose of the battery in accordance with local regulations and instructions from your service provider.

CAUTION:
- Lithium Battery Caution: Danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type. Dispose batteries according to manufacturer's instructions.
- Disposal of a BATTERY into fire or a hot oven, or mechanically crushing or cutting of a BATTERY, that can result in an EXPLOSION
- Leaving a BATTERY in an extremely high temperature surrounding environment that can result in an EXPLOSION or the leakage of flammable liquid or gas.
- A BATTERY subjected to extremely low air pressure that may result in an EXPLOSION or the leakage of flammable liquid or gas.

Mise en garde!
AVERTISSEMENT : Il existe un risque d'explosion si la batterie est mal manipulée ou remplacée de manière incorrecte. Remplacez uniquement par le même type de batterie. Ne le démontez pas et ne tentez pas de le recharger en dehors du système. Ne pas écraser, percer, jeter au feu, court-circuiter les contacts externes ou exposer à l'eau ou à d'autres liquides. Jetez la batterie conformément aux réglementations locales et aux instructions de votre fournisseur de services.

MISE EN GARDE:
- Pile au lithium Attention : Danger d'explosion si la pile n'est pas remplacée correctement. Remplacer uniquement par un type identique ou équivalent. Jetez les piles conformément aux instructions du fabricant.
- L'élimination d'une BATTERIE dans le feu ou dans un four chaud, ou l'écrasement ou le découpage mécanique d'une BATTERIE, pouvant entraîner une EXPLOSION
- Laisser une BATTERIE dans un environnement à température extrêmement élevée pouvant entraîner une EXPLOSION ou une fuite de liquide ou de gaz inflammable.
- UNE BATTERIE soumise à une pression d'air extrêmement basse pouvant entraîner une EXPLOSION ou une fuite de liquide ou de gaz inflammable.

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1. Getting Started

1.1 Safety Precautions

Warning!



Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution!



Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

1.2 Packing List

Before installation, please ensure all the items listed in the following table are included in the package.

Item	Description	Q'ty
1	ECM-MTL 3.5" Micro Module	1
2	Serial ATA cable (7-pin, standard)	1
3	Wire SATA power cable (15-pin, 4P/2.0mm)	1
4	Flat Cable 9P(M)-PHD (10P/2.0mm)	1
5	CPU Heatsink/Cooler set	1
6	M.2 screws	
7	Graphene sheet	



If any of the above items is damaged or missing, contact your retailer.

1.3 Manual Objectives

This manual describes in details Avalue Technology ECM-MTL Single Board.

We have tried to include as much information as possible but we have not duplicated information that is provided in the standard IBM Technical References, unless it proved to be necessary to aid in the understanding of this board.

We strongly recommend that you study this manual carefully before attempting to set up ECM-MTL or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance.

Please be aware that it is possible to create configurations within the CMOS RAM that make booting impossible. If this should happen, clear the CMOS settings, (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors regarding this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

1.4 System Specifications

System	
CPU	Onboard Intel® Core™ Meteor Lake-U & H series Ultra 7/ Ultra 5 BGA Processor, supports TDP 15/28W Intel® Core™ Ultra 5 Processor 125U Intel® Core™ Ultra 5 Processor 125H
BIOS	AMI uEFI BIOS, 256Mbit SPI Flash ROM
I/O Chip	EC-ITE: IT5782VG
System Memory	One 262-pin SO-DIMM socket (Capacity Max.Up to 48GB DDR5 5600MHz)
Watchdog Timer	H/W Reset, 1sec. – 65535sec./min.1sec. or 1min. step
H/W Status Monitor	CPU temperature monitoring Voltages monitoring CPU fan speed control
TPM	Onboard NuvoTon NPCT760AABYX support TPM 2.0 (BOM optional) co lay Infineon SLB9670VQ2.0
iAMT	Yes, IAMT 13.0
Expansion Slot	
M.2	1 x M.2 Key-E 2230 support WiFi module (1 x PCIe x1 & USB 2.0 Signal) 1 x M.2 Key-B 2242/3042/3052 with PCIe x1 Gen 2 Signal, Nano SIM card slot for LTE/IO Cards support WWAN+GNSS or PCIe x1 SSD, and USB2.0, support 5G (3.3V & 3.8V) * Does not support I2S and PCM functions * Only supports one SIM card (co-lay 1 x 10pin FPC connector for uSIM card adapter) * 1 x 1 x 3 pin, pitch 2.00mm connector for M.2 module card 3.3V and 3.8V selection (Jumper default: 1-2 for 3.3V) 1 x M.2 Key-M 2280 (with 1 x PCIe Gen4 x4) for storage NVMe SSD
Storage	
M.2	1 x M.2 Type B 2242/3042/3052 (with PCIe x1 or SATA, USB 3.2 Gen1x1, USB 2.0 with 1 x SIM card slot support WWAN+GNSS or SSD) support 5G (3.3V & 3.8V) 1 x M.2 Key-M 2280 (with 1 x PCI-e Gen4 x4) for storage NVMe SSD
SATA	1 x SATA III connector
Edge I/O	
LAN	2 x RJ45
USB	2 x USB 3.2 Gen 2 x1 +1 x USB 3.2 Gen 1 x1 Type A +5VSB/0.9A + 1 x USB Type-C 5V3A (with USB 3.2 Gen 2x2 & DP 1.4a signal display output)
DP	1 x DP 1.4a

HDMI	1 x HDMI 2.0b
DC Input	1 x DC Jack lockable connector type
Onboard I/O	
COM	JCOM1, JCOM2: 2 x 5 pin, pitch 2.00mm pin header, support RS232/422/485, RS422/485 by BIOS setting. JCOM3, JCOM4: 2 x 5 pin, pitch 2.00mm pin header support RS232
USB	JUSB1, JUSB2: 2 x 5 pin, pitch 2.00mm wafer support 4 USB 2.0, +5VSB/0.5A
GPIO	2 x 6 pin, pitch 2.00mm pin header for 8 bit GPIO, SMBUS, (JDIO1) (Max. 1A output)
SATA Power	1 x 4 pin, pitch 2.00mm wafer for 12V/5V Power SATA Power, 12V：0.75A, 5V：1.5A
CPU/System FAN	1 x 4 pin, pitch 2.54mm wafer for CPU fan connector with smart fan function supported.
Buzzer	1 x 2 pin, pitch 2.0mm wafer for Buzzer.(JBZ1)
Front Panel	2 x 5 pin, pitch 2.00mm wafer for Front panel.(JFP1) HDD LED, Power LED, Reset button, Power button
RTC Battery	1 x 2 pin, pitch 1.25mm wafer for horizontal SMT type battery connector (CR2450 Battery+Cable 3V/600mAh 2P/170mm KTS (-20~+70°C)
AT/ATX Selector	1 x 3 pin, pitch 2.00mm pin header for AT/ATX jumper, default AT. (JAT1)
Clear CMOS	1 x 3 pin, pitch 2.00mm pin header for Clear COMS jumper. (JCMOS1)
LVDS	1 x 40-pin, pitch 1.25mm wafer for LVDS or eDP. (1 x 2x20-pin Hirose connector for Dual channel 24-bit LVDS),(EDP_LVDS1) Max. 5V：1A, 3.3V：1A output Note: EDP_LVDS1 Support 1 x LVDS or 1 x eDP, Co-layout eDP signal, use the same connector
LCD Backlight Brightness	1 x 5 pin, pitch 2.00mm wafer for LVDS backlight.(JBKL) (+5V/+12V, 1A)
BIOS SPI	2 x 4 pin, pitch 2.00mm pin header (JBIOS1)
eSPI	2 x 6 pin, pitch 2.00mm pin header (JESPI1)
Audio	2 x 6 pin, pitch 2.00mm pin header (For Line in, Line out, Mic in) (JAUDIO1)
DC-Input	PWR1 (2 x 2 pin, pitch 4.2mm connector for power input connector.) Default N/A. Co-lay with DC_IN.
Amp Connector	1 x 4 pin, pitch 2.00mm wafer for 2W x 2 Speaker (SPK1)
Display	
Graphic Chipset	Intel® Xe LPG Graphics
Spec. & Resolution	Note: This resolution is actual test result: 1 x DP 1.4a: 7680 x 4320@30 Hz 1 x USB Type C support DP: 4096 x 2160@60Hz 1 x HDMI 2.0b: 3840 x 2160@60Hz Intel resolution as below:

<table>
<tr><td></td><td>1 x DP 1.4a: Max: 7680 x 4320@60 Hz
1 x USB Type C support DP1.4a: 4096 x 2160@60Hz
1 x HDMI 2.0b: 4096x2160@60Hz

1 x LVDS: 1920 x 1080 Dual channel 18/24-bits LVDS (Chrontel CH7513A-BF eDP to LVDS) or 1 x eDP: 1920 x 1080@60Hz (2 Lanes), default LVDS
Note: EDP_LVDS1 Support 1 x LVDS or 1 x eDP</td></tr>
<tr><td>Multiple Display</td><td>Four Display
1 x DP 1.4a, 1 x HDMI 2.0b, 1 x 2CH LVDS or 1 x eDP, 1 x USB type C support DP1.4a</td></tr>
<tr><td>Audio</td><td></td></tr>
<tr><td>Audio Codec</td><td>RealTek ALC888S-VD2-GR</td></tr>
<tr><td>Amplifier</td><td>RealTek ALC105 2W4Ω per channel Amplifier</td></tr>
<tr><td>Ethernet</td><td></td></tr>
<tr><td>LAN Chipset</td><td>LAN1: Intel® I226LM 2.5 Gigabit Ethernet Controller
LAN1: Intel® I226V 2.5 Gigabit Ethernet Controller</td></tr>
<tr><td>LAN Spec.</td><td>LAN1: Intel® I226LM (10/100/1000/2.5G speeds)
LAN2: Intel® I226V (10/100/1000/2.5G speeds)</td></tr>
<tr><td>LED Indicator</td><td>Fill with model name or part number or spec.
Example:
<table>
<tr><td colspan="4">Max. 1G LAN Port</td></tr>
<tr><td colspan="2">ACT/LINK</td><td colspan="2">SPEED</td></tr>
<tr><td>LED</td><td>Definition</td><td>LED</td><td>Definition</td></tr>
<tr><td>Light Off</td><td>No Link</td><td>Solid Orange</td><td>1G</td></tr>
<tr><td>Solid Yellow</td><td>Connection</td><td>Solid Green</td><td>100M</td></tr>
<tr><td>Yellow Flashing</td><td>Activity</td><td>Light Off</td><td>10M</td></tr>
<tr><td colspan="4">Max. 2.5G LAN Port</td></tr>
<tr><td colspan="2">ACT/LINK</td><td>SPEED</td><td></td></tr>
<tr><td></td><td>Definition</td><td>LED</td><td>Definition</td></tr>
<tr><td>Light Off</td><td>No Link</td><td>Solid Orange</td><td>2.5G</td></tr>
<tr><td>Solid Yellow</td><td>Connection</td><td>Solid Green</td><td>1G/100M</td></tr>
<tr><td>Yellow Flashing</td><td>Activity</td><td>Light Off</td><td>10M</td></tr>
</table></td></tr>
<tr><td>Mechanical & Environmental</td><td></td></tr>
<tr><td>Power Requirement</td><td>DC in +12V~ +24V</td></tr>
<tr><td>ACPI</td><td>Single power ATX Support S0, S4, S5, ACPI 5.0 compliant</td></tr>
<tr><td>Power Mode</td><td>HW: AT (AT / ATX mode Switchable Through Jumper)</td></tr>
<tr><td>Operating Temp.</td><td>0~60°C (32~140°F) with 0.5m/s air flow</td></tr>
<tr><td>Storage Temp.</td><td>-40~ +75°C</td></tr>
</table>

Operating Humidity	40°C 95% Relative Humidity, Non-condensing
Size (L x W) (Please consult product engineers for the production feasibility if the size is larger than 410x360mm or smaller than 80x70mm)	5.7" x 4" (146mm x 101mm)
Weight	0.40kg
Vibration Test	Package Vibration Test Reference IEC60068-2-64 Testing procedures Test Fh: Vibration broadband random Test 1. PSD: 0.026G²/Hz, 2.16 Grms 2. Non-operation mode 3. Test Frequency: 5-500Hz 4. Test Axis: X,Y and Z axis 5. 30 min. per each axis 6. IEC 60068-2-64 Test:Fh Random Vibration Operation Reference IEC60068-2-64 Testing procedures Test Fh : Vibration broadband random Test 1. PSD: 0.00454G²/Hz, 1.5 Grms 2. Operation mode 3. Test Frequency : 5-500Hz 4. Test Axis : X,Y and Z axis 5. 30 minutes per each axis 6. IEC 60068-2-64 Test:Fh Random Vibration Non Operation Reference IEC60068-2-64 Testing procedures Test Fh : Vibration broadband random Test 1. PSD: 0.01818G²/Hz, 3.0 Grms 2. Non Operation mode 3. Test Frequency : 5-500Hz 4. Test Axis : X,Y and Z axis 5. 30 minutes per each axis 6. IEC 60068-2-64 Test:Fh
Drop Test	Packing Drop Reference ISTA 2A, Method : IEC-60068-2-32 Test: Ed Drop Test

	1 One corner , three edges, six faces 2 ISTA 2A, IEC-60068-2-32 Test:Ed
OS Information	Windows 11 64bit, Linux



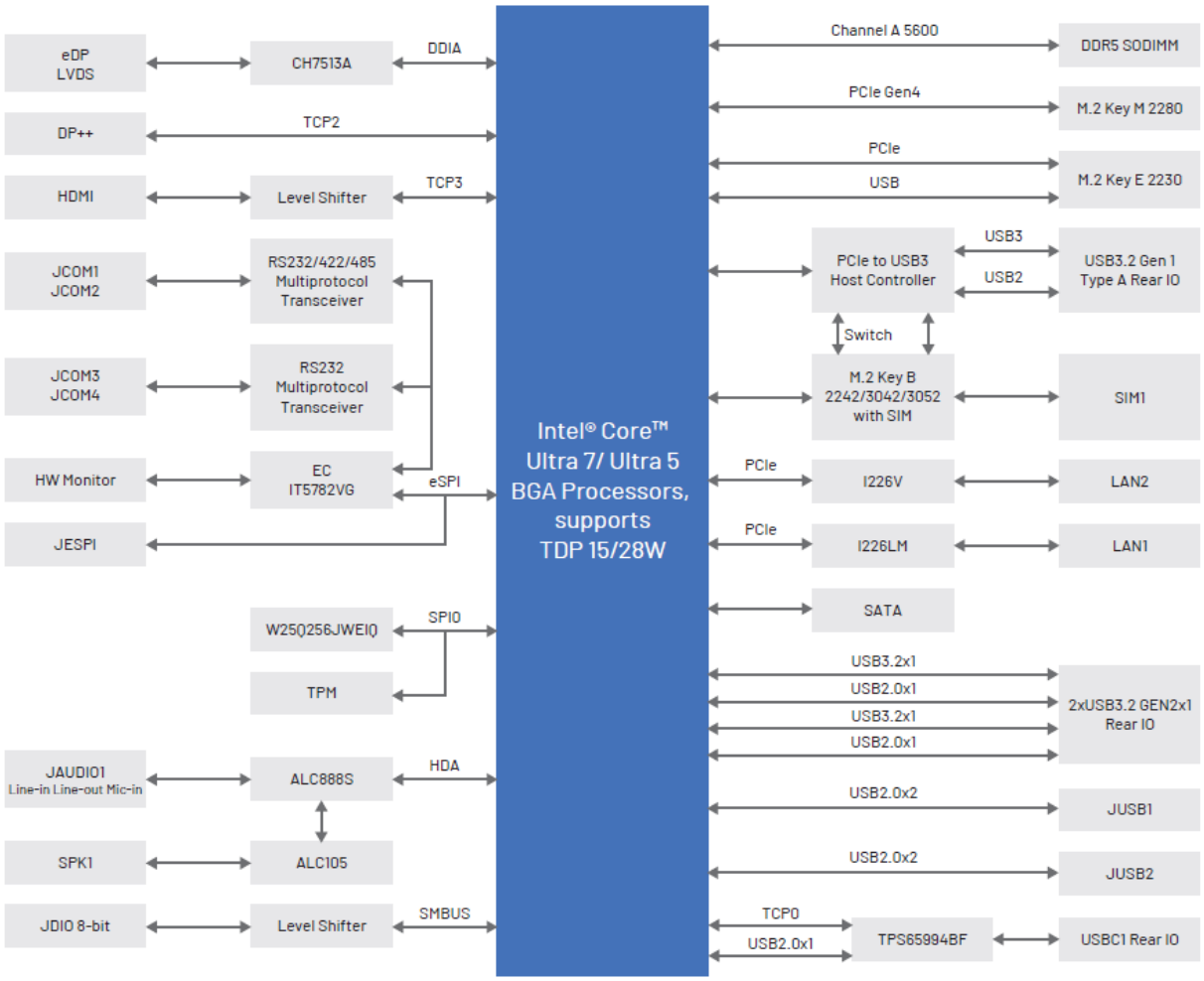
Note: Specifications are subject to change without notice.

User condition suggestion:

1. Intel Meteor Lake U/H support Wi-Fi 6/6E/7, does not support Intel® Wireless AC 9560 & AC9260.
2. Intel® Wi-Fi 7 BE200 does not support S4/S5.
3. User should consider overall power consumption including CPU and devices add-on, to choose suitable power adapter. If may need 28W CPU with higher power application, may use 2Px2 Wafer connector instead of DC Jack.
4. Intel Sightings report alerts for DDR5 memory instability during Power Cycle Test and may affect booting.

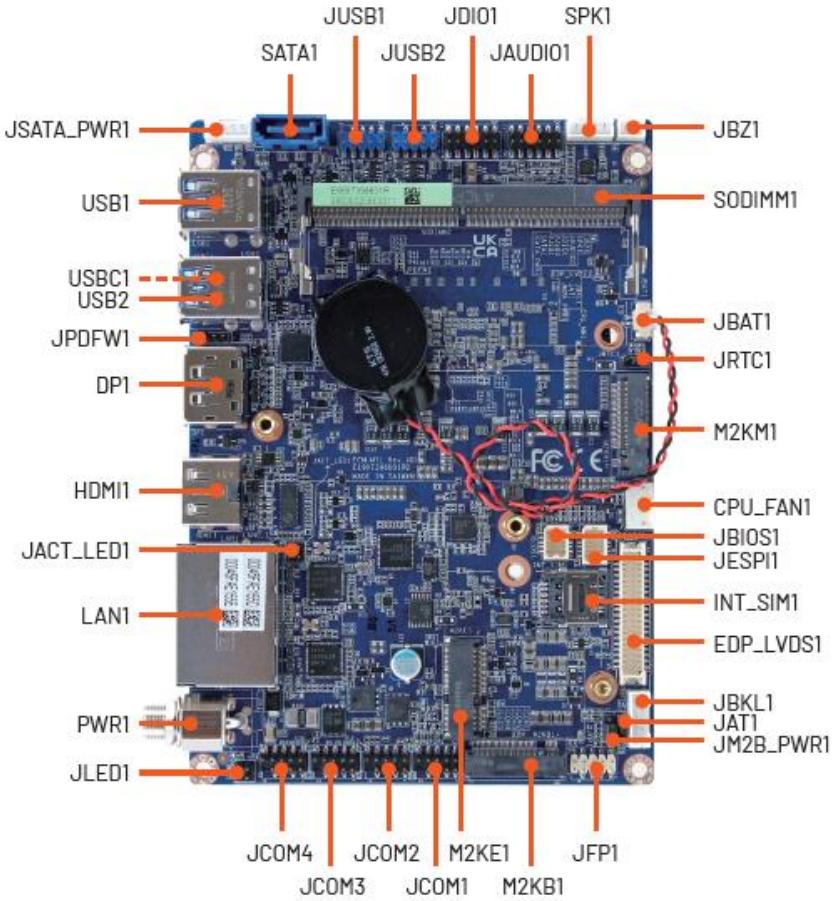
1.5 Architecture Overview—Block Diagram

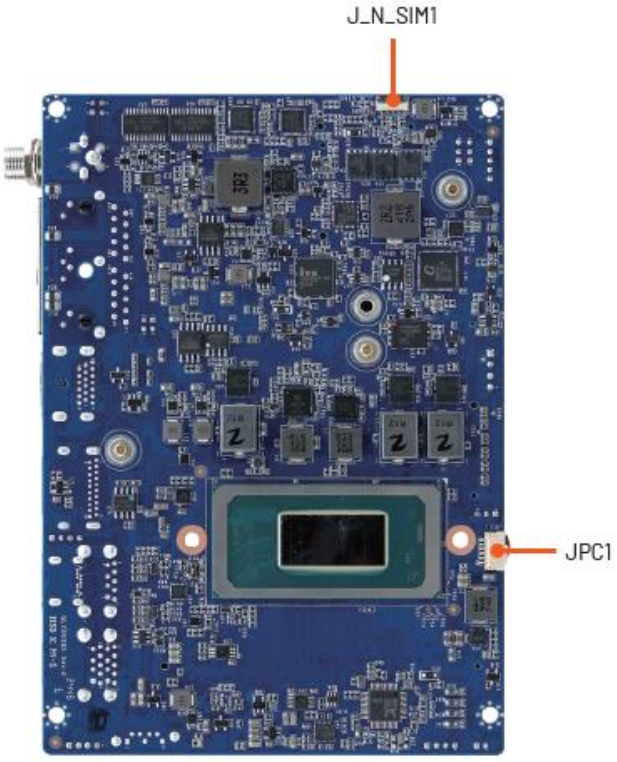
The following block diagram shows the architecture and main components of ECM-MTL.



2. Hardware Configuration

2.1 Product Overview

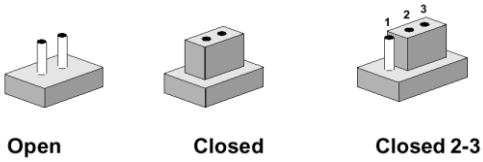




2.2 Jumper and Connector List

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the clip. To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case, you would connect either two pins.



The jumper settings are schematically depicted in this manual as follows:



A pair of needle-nose pliers may be helpful when working with jumpers.

Connectors on the board are linked to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

The following tables list the function of each of the board's jumpers and connectors.

Jumpers

Label	Function	Note
JAT1	AT/ATX Input power select	3 x 1 header, pitch 2.00mm
JRTC1	Clear CMOS	3 x 1 header, pitch 2.00mm
JM2B_PWR1	M.2 Key power select	3 x 1 header, pitch 2.00mm

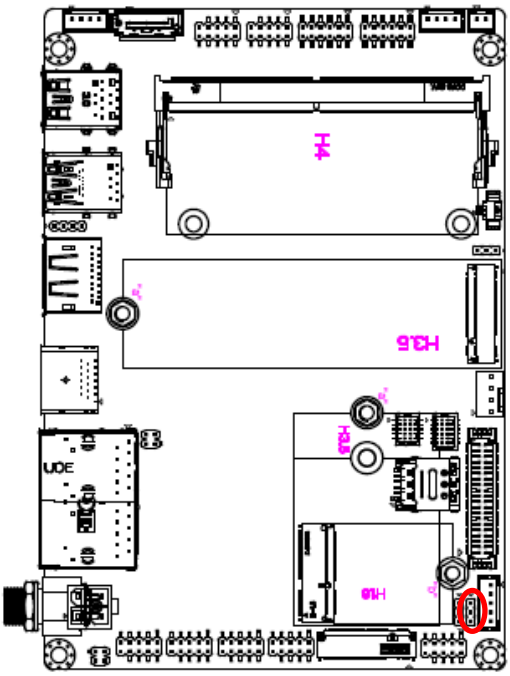
Connectors

Label	Function	Note
JBKL1	LCD inverter backlight connector	5 x 1 wafer, pitch 2.00mm Matching Connector: JST PHR-5
CPU_FAN1	CPU fan connector	4 x 1 wafer, pitch 2.54mm
JCOM1	Serial port 1 connector	5 x 2 header, pitch 2.00mm
JCOM2	Serial port 2 connector	5 x 2 header, pitch 2.00mm
JCOM3	Serial port 1 connector	5 x 2 header, pitch 2.00mm

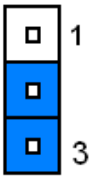
JCOM4	Serial port 2 connector	5 x 2 header, pitch 2.00mm
JDIO1	General purpose I/O connector	6 x 2 header, pitch 2.00mm
PWR1	Power connector	2 x 2 wafer, pitch 4.20mm
M2KM1	M.2 KEY-M 2280 connector	
M2KE1	M.2 KEY-E 2230 connector	
M2KB1	M.2 KEY-B 2242/3042/3052 connector	
LAN1	2 x RJ-45 Ethernet	
HDMI1	HDMI connector	
JFP1	Front Panel connector	5 x 2 header, pitch 2.00mm
DP1	DP connector	
USB1	1 x USB2.0 connector 1 x USB3.2 Gen2 connector	
USB2	USB3.2 Gen2 connector	
USBC1	USB Type C connector	
JUSB1	USB2.0 connector	5 x 2 header, pitch 2.00mm
JUSB2	USB2.0 connector	5 x 2 header, pitch 2.00mm
JBIOS1	BIOS SPI connector	5 x 2 wafer, pitch 1.00mm
JESPI1	ESPI connector	6 x 2 wafer, pitch 1.00mm
SATA1	Serial ATA connector	
JSATA_PWR1	SATA Power connector	4 x 1 wafer, pitch 2.00mm
EDP_LVDS1	eDP/LVDS connector	DIN 40-pin wafer, pitch 1.25mm Matching Connector: Hirose DF13-40DS-1.25C
JBZ1	PC Buzzer connector	2 x 1 wafer, pitch 2.00mm
SODIMM1	DDR5 SODIMM socket	
INT_SIM1	SIM card slot	
JBAT1	Battery connector	2 x 1 wafer, pitch 1.25mm
SPK1	Speaker connector	4 x 1 wafer, pitch 2.00mm
JAUDIO1	Audio connector	6 x 2 header, pitch 2.00mm
JLED1	LED connector	2 x 2 header, pitch 2.00mm
JACT_LED1	ACT LED connector	2 x 2 header, pitch 2.00mm
JPDFW1	PD JTAG connector	4 x 1 header, pitch 2.00mm
J_N_SIM1	SIM card connector	10 x 1 wafer, pitch 0.50mm
JPC1	PC connector	6 x 1 wafer, pitch 1.00mm

2.3 Setting Jumpers & Connectors

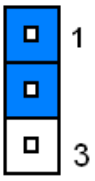
2.3.1 AT/ATX Input power select (JAT1)



AT*

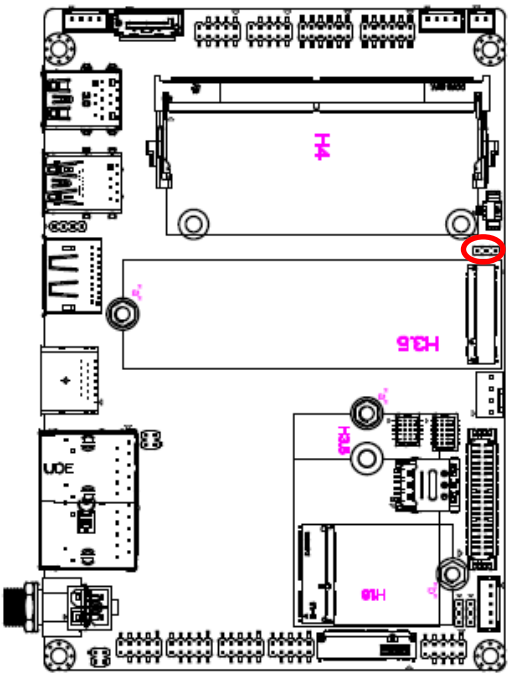


ATX

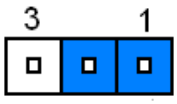


*** Default**

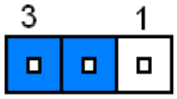
2.3.2 Clear CMOS (JRTC1)



Normal*

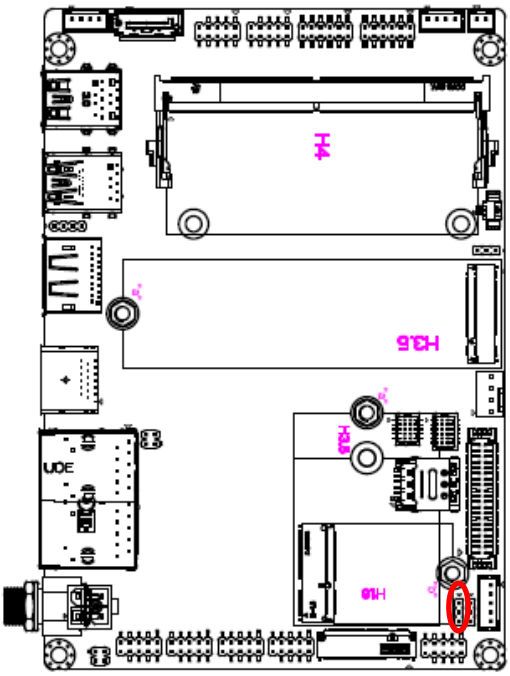


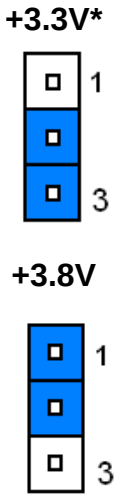
Clear CMOS



*** Default**

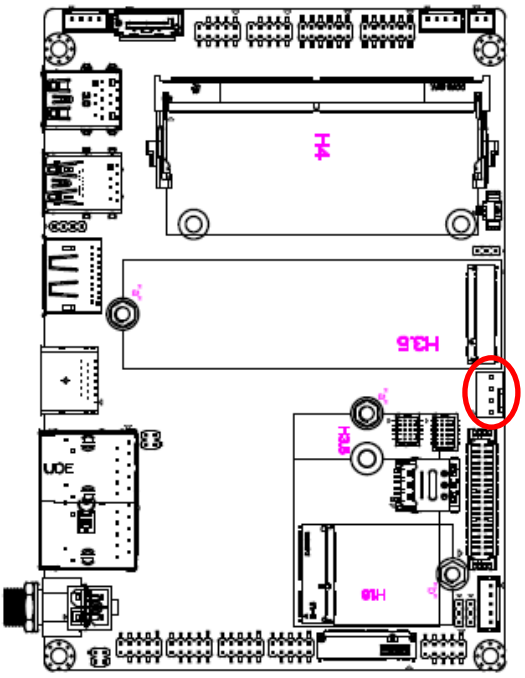
2.3.3 M.2 Key power select (JM2B_PWR1)

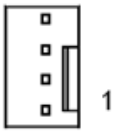




*** Default**

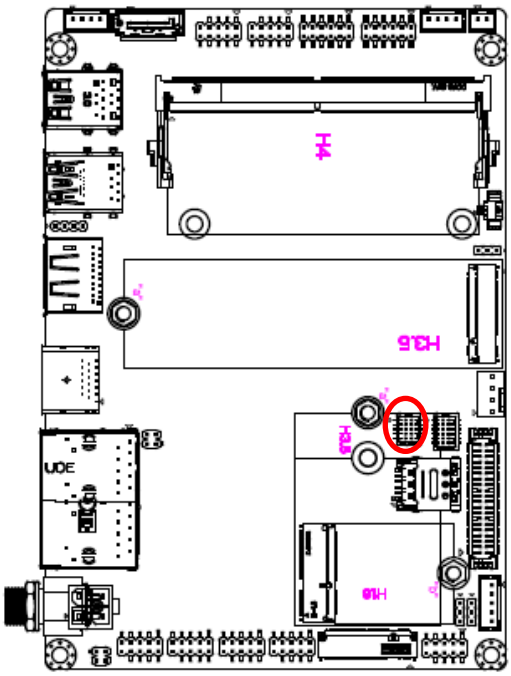
2.3.4 CPU fan connector (CPU_FAN1)





Signal	PIN
FAN_PWM0	4
EC_TACH0	3
+12V	2
GND	1

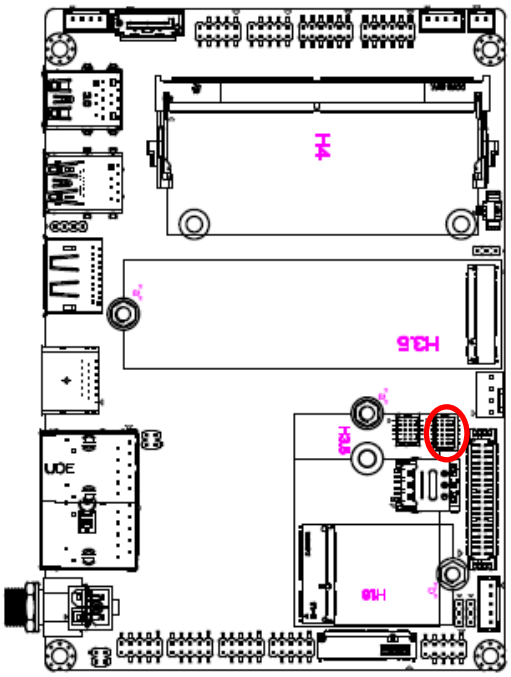
2.3.5 BIOS SPI connector (JBIOS1)





Signal	PIN	PIN	Signal
+1.8VSB	1	2	GND
SPI0_CS0#	3	4	SPI0_BIOS_CLK
SPI0_BIOS_MISO	5	6	SPI0_BIOS_MOSI
SPI0_HOLD#	7	8	BIOS_WP#
EC_SMCLK_DEBUG	9	10	EC_SMDAT_DEBUG

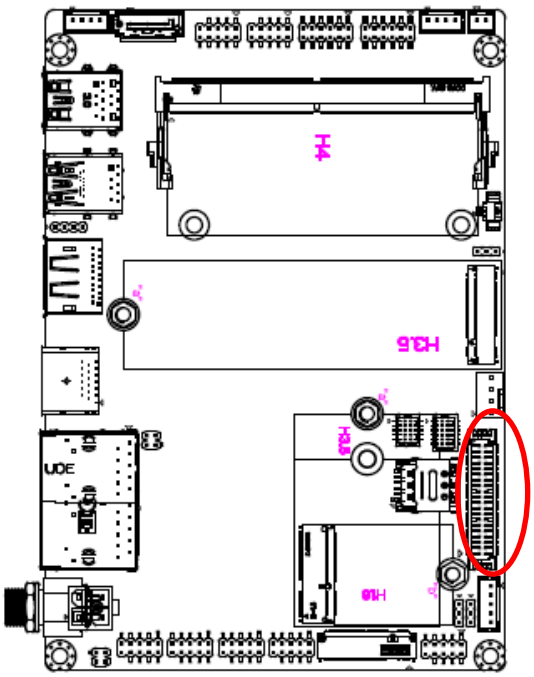
2.3.6 ESPI connector (JESPI1)

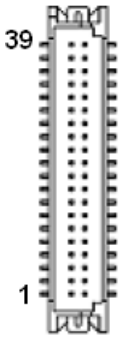




Signal	PIN	PIN	Signal
ESPI_IO0_80P	1	2	+3.3VSB
ESPI_IO1_80P	3	4	RST_SOCKET#
ESPI_IO2_80P	5	6	ESPI_CS#
ESPI_IO3_80P	7	8	ESPI_CLK_80P
ESPI_CS1#	9	10	GND
ESPI_RST#	11	12	ESPI_ALERT1#

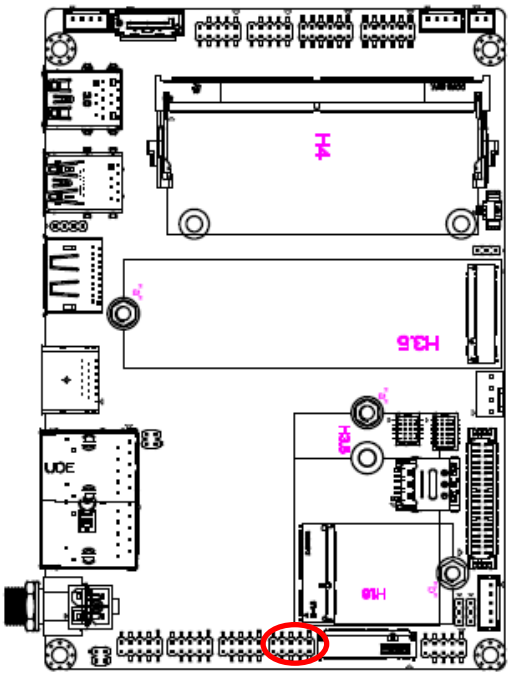
2.3.7 eDP/LVDS connector (EDP_LVDS1)

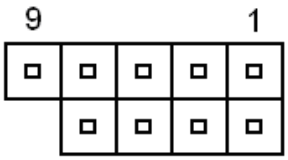




Signal	PIN	PIN	Signal
+12V	39	40	+12V
GND	37	38	GND
LVDS_CLK2N	35	36	LVDS_CLK1N/eDPAUXN
LVDS_CLK2P	33	34	LVDS_CLK1P/eDPAUXP
GND	31	32	GND
LVDS_DATAN7	29	30	LVDS_DATAN6
LVDS_DATAP7	27	28	LVDS_DATAP6
GND	25	26	GND
LVDS_DATAN5	23	24	LVDS_DATAN4
LVDS_DATAP5	21	22	LVDS_DATAP4
GND	19	20	GND
LVDS_DATAN3	17	18	LVDS_DATAN2/eDPN0
LVDS_DATAP3	15	16	LVDS_DATAP2/eDPP0
GND	13	14	GND
LVDS_DATAN1/eDPN1	11	12	LVDS_DATAN0
LVDS_DATAP1/eDPP1	9	10	LVDS_DATAP0/eDP_HPD
GND	7	8	GND
+3.3V	5	6	+5V
+3.3V	3	4	+5V
+3.3V	1	2	+5V

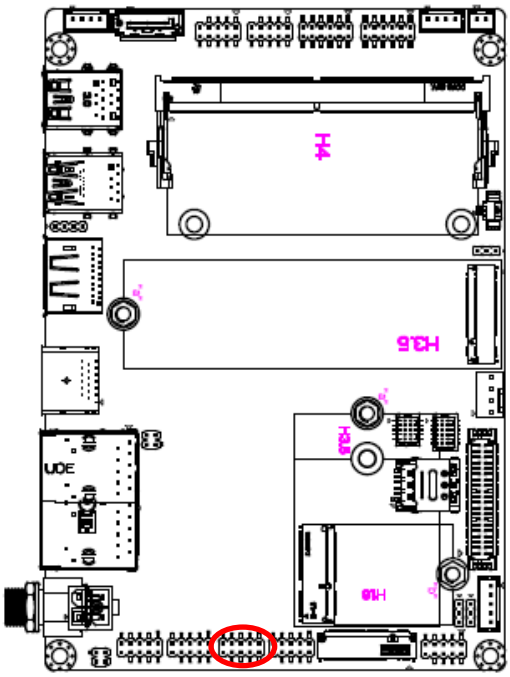
2.3.8 Serial port 1 connector (JCOM1)

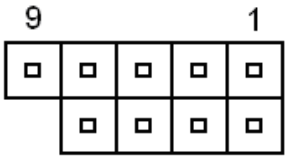




Signal	PIN	PIN	Signal
COM_RXD_TXP_1	2	1	COM_DCD#_TXN_1
COM_DTR#_RXN_1	4	3	COM_TXD_RXP_1
COM_DSR#_1	6	5	GND
COM_CTS#_1	8	7	COM_RTS#_1
		9	COM_RI#_1

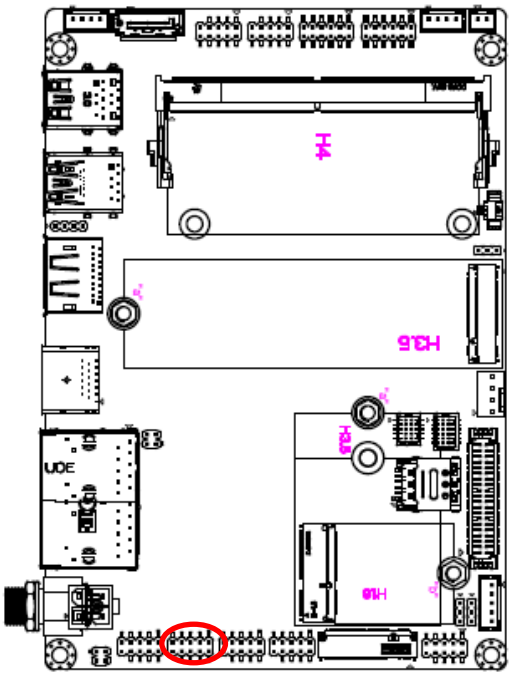
2.3.9 Serial port 2 connector (JCOM2)

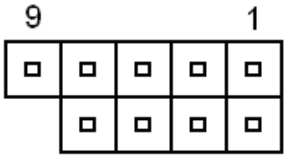




Signal	PIN	PIN	Signal
COM_RXD_TXP_2	2	1	COM_DCD#_TXN_2
COM_DTR#_RXN_2	4	3	COM_TXD_RXP_2
COM_DSR#_2	6	5	GND
COM_CTS#_2	8	7	COM_RTS#_2
		9	COM_RI#_2

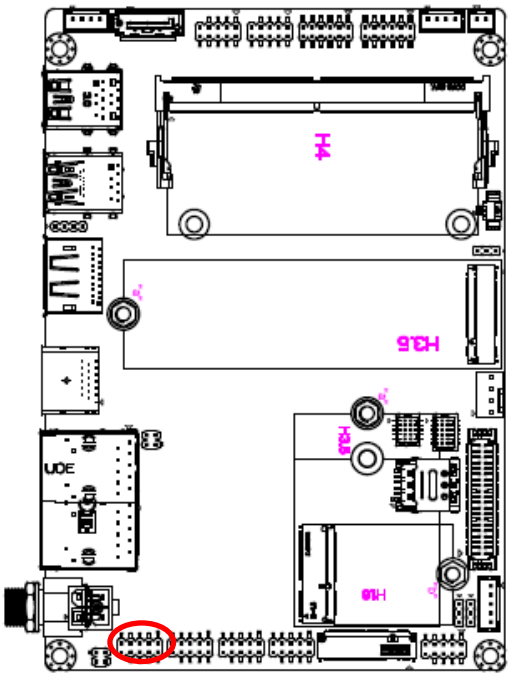
2.3.10 Serial port 3 connector (JCOM3)

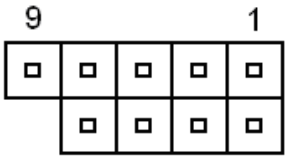




Signal	PIN	PIN	Signal
NRXDC	2	1	NDCDC#
NDTRC#	4	3	NTXDC
NDSRC#	6	5	GND
NCTSC#	8	7	NRTSC#
		9	NRIC#

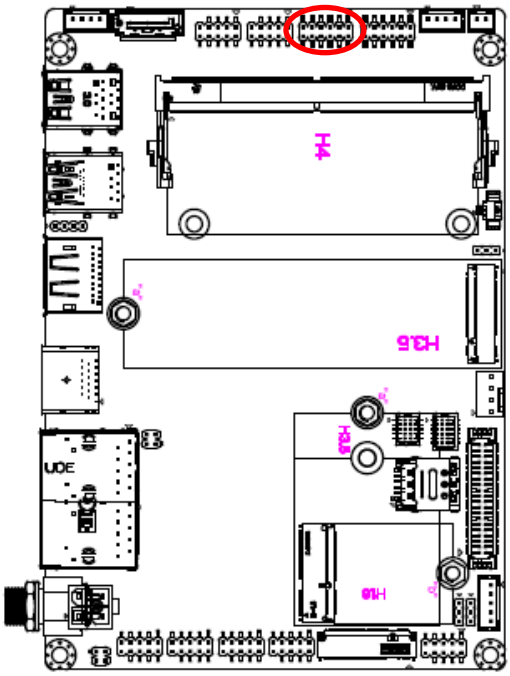
2.3.11 Serial port 4 connector (JCOM4)

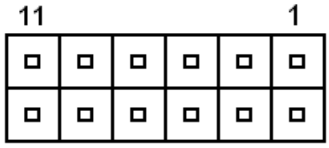




Signal	PIN	PIN	Signal
NRXDD	2	1	NDCDD#
NDTRD#	4	3	NTXDD
NDSRD#	6	5	GND
NCTSD#	8	7	NRTSD#
		9	NRID#

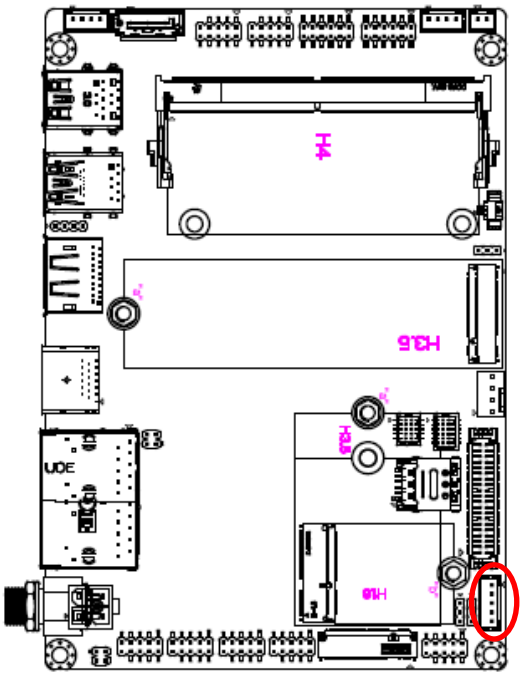
2.3.12 General purpose I/O connector (JDIO1)





Signal	PIN	PIN	Signal
DI0	1	2	DO0
DI1	3	4	DO1
DI2	5	6	DO2
DI3	7	8	DO3
SMB_SCL_S0_3P3EXT	9	10	SMB_SDA_S0_3P3EXT
GND	11	12	+5V

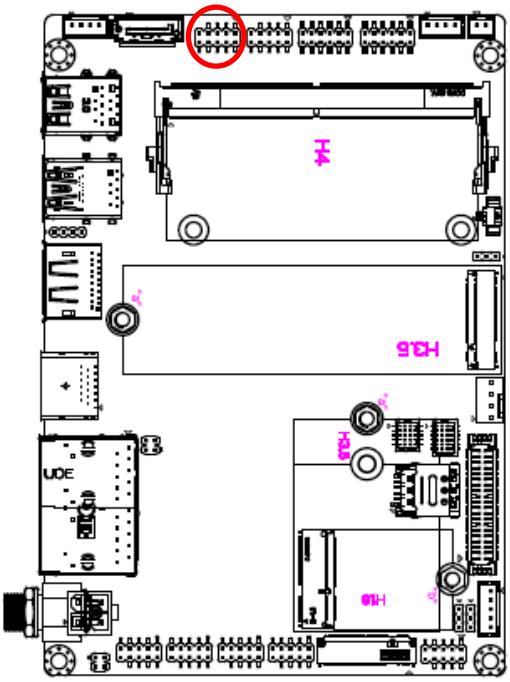
2.3.13 LCD inverter backlight connector (JBKL1)

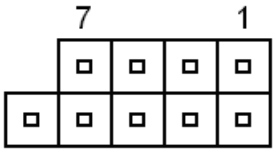




Signal	PIN
+12V	1
GND	2
BKLEN	3
VBRIGHT	4
+5V	5

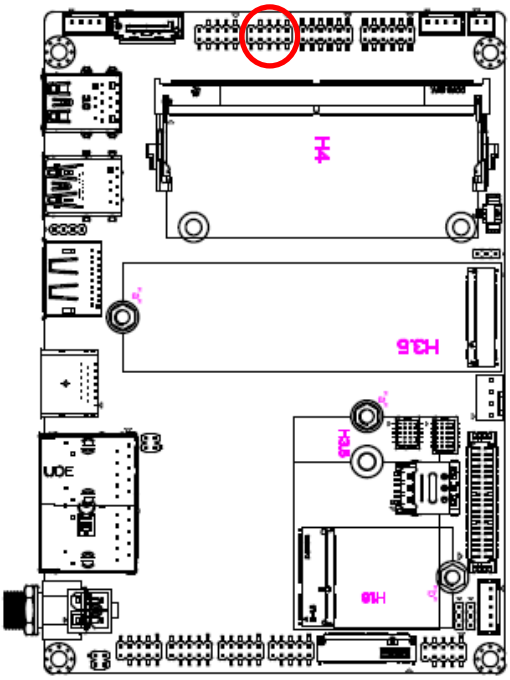
2.3.14 USB2.0 connector (JUSB1)

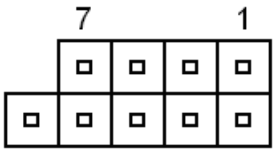




Signal	PIN	PIN	Signal
+5VSB	1	2	+5VSB
USB2_DN5_HDR	3	4	USB2_DN6_HDR
USB2_DP5_HDR	5	6	USB2_DP6_HDR
GND	7	8	GND
		10	GND

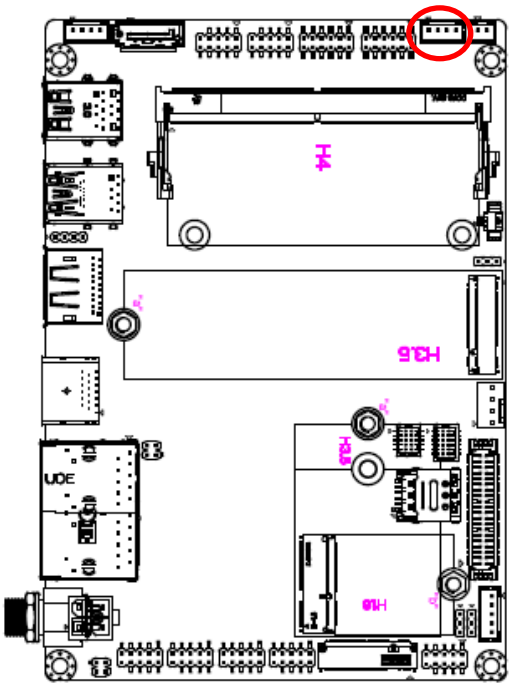
2.3.15 USB2.0 connector (JUSB2)

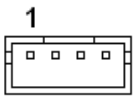




Signal	PIN	PIN	Signal
+5VSB	1	2	+5VSB
USB2_DN7_HDR	3	4	USB2_DN8_HDR
USB2_DP7_HDR	5	6	USB2_DP8_HDR
GND	7	8	GND
		10	GND

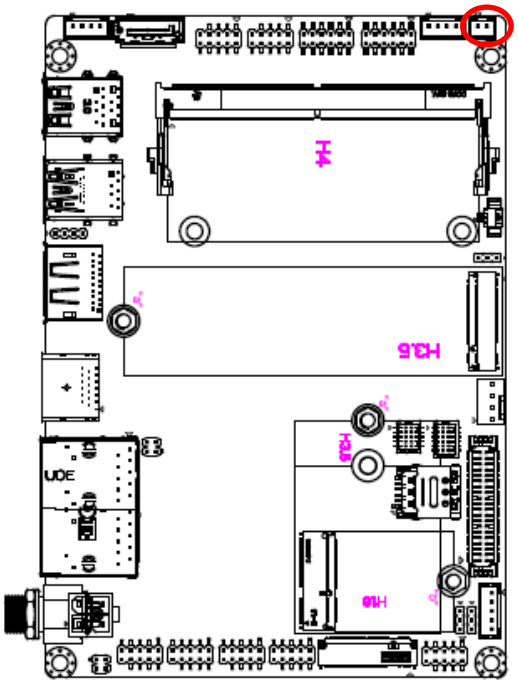
2.3.16 Speaker connector (SPK1)





Signal	PIN
SPK_L+	1
SPK_L-	2
SPK_R+	3
SPK_R-	4

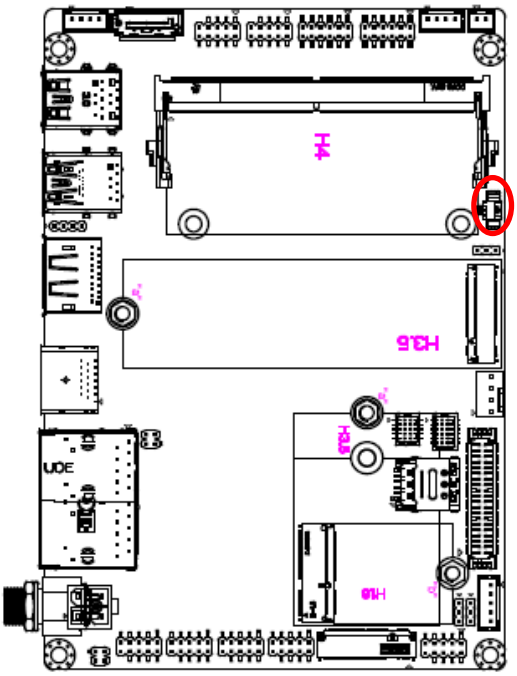
2.3.17 PC Buzzer connector (JBZ1)

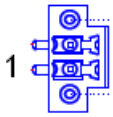




Signal	PIN
SPKR-	1
+5V	2

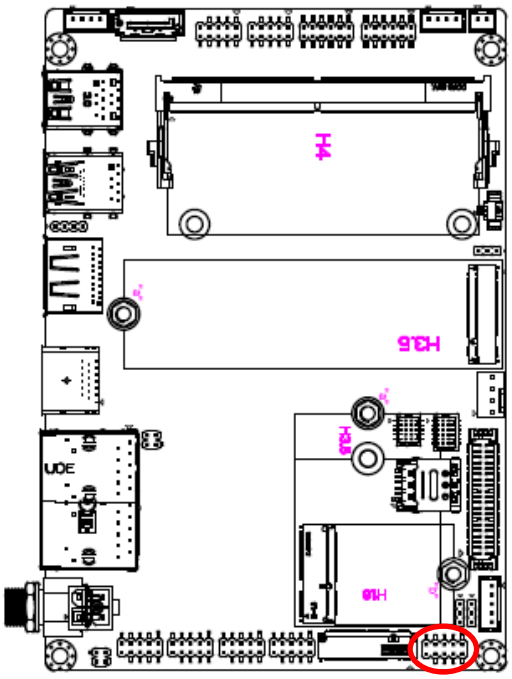
2.3.18 Battery connector (JBAT1)

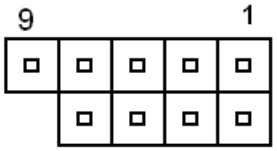




Signal	PIN
GND	2
+RTCBATT_R	1

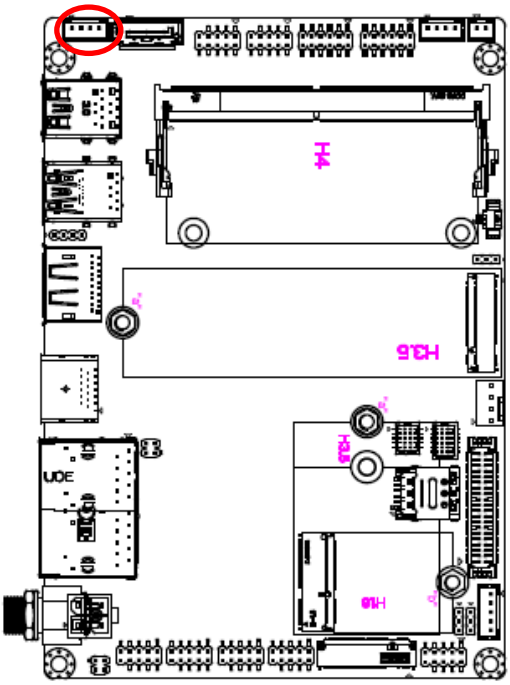
2.3.19 Front Panel connector (JFP1)

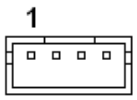




Signal	PIN	PIN	Signal
+HD_LED	1	2	+PWR_LED
-HD_LED	3	4	-PWR_LED
+Reset	5	6	+PWR_BNT
-Reset	7	8	-PWR_BNT
NC	9		

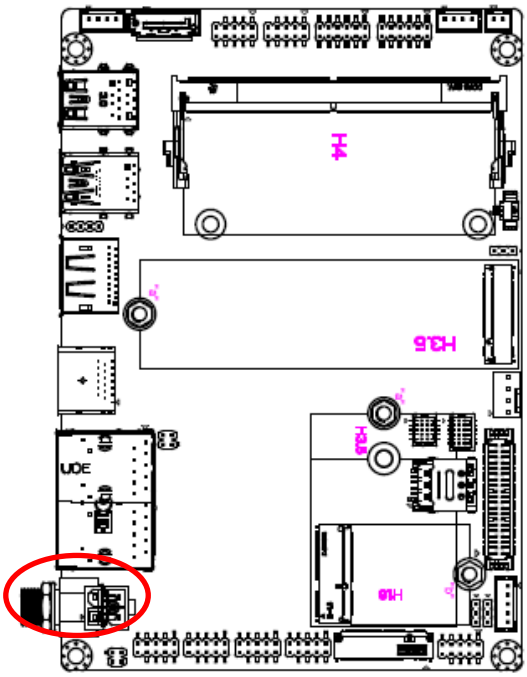
2.3.20 SATA Power connector (JSATA_PWR1)

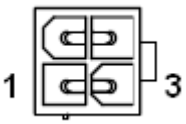




Signal	PIN
+5V	1
GND	2
GND	3
+12V	4

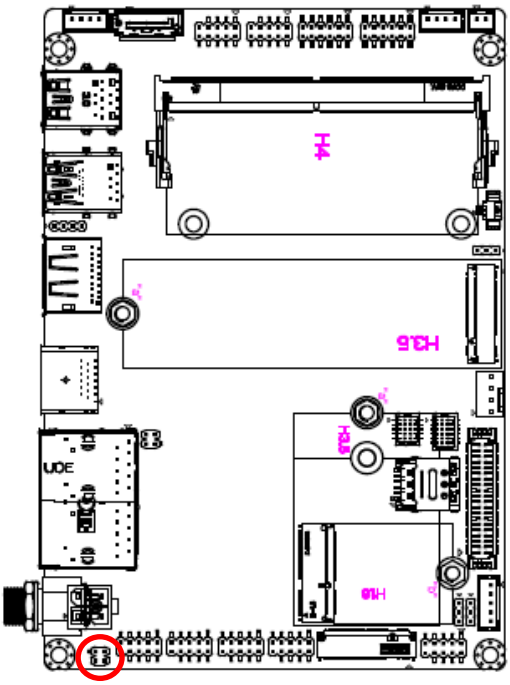
2.3.21 Power connector (PWR1)

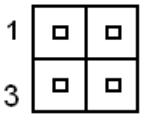




Signal	PIN	PIN	Signal
GND	2	4	+VIN_12-24V
GND	1	3	+VIN_12-24V

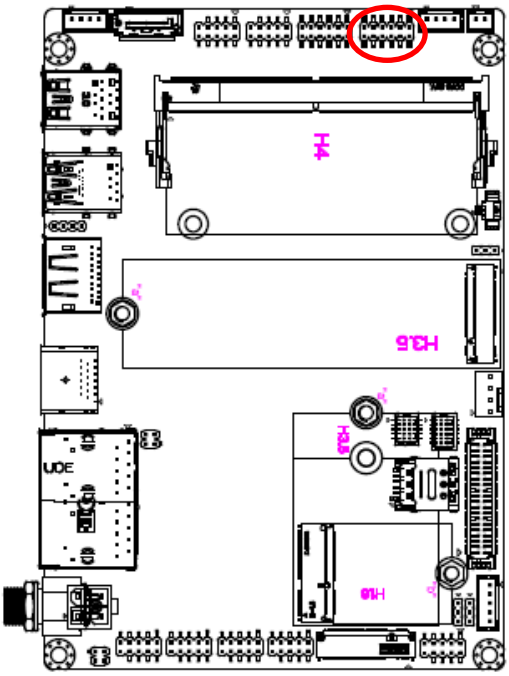
2.3.22 LED connector (JLED1)

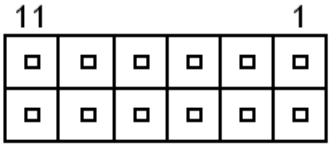




Signal	PIN	PIN	Signal
LED_WWAN_P	1	2	LED_WWAN#
LED_WLAN_P	3	4	LED_WLAN#

2.3.23 Audio connector (JAUDIO1)



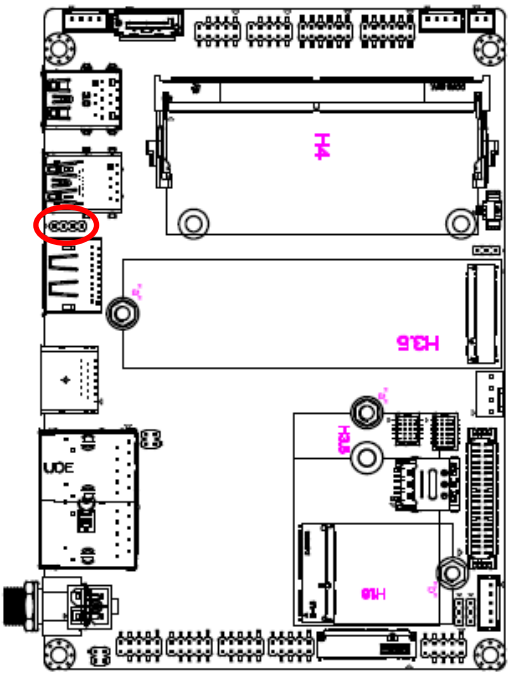


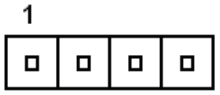
Signal	PIN	PIN	Signal
LINEOUT_R	1	2	LINEOUT_L
GND_AUD	3	4	GND_AUD
LINEIN_R	5	6	LINEIN_L
MICIN_R	7	8	MICIN_L
LINEOUT1_JD	9	10	LINE1-JD
MIC1_JD	11	12	GND_AUD

2.3.23.1 Signal Description – Audio connector (JAUDIO1)

Signal	Signal Description
LINE1-JD	AUDIO IN (LINE_RIN/LIN)sense pin
LINEOUT1_JD	AUDIO Out(ROUT/LOUT) sense pin
MIC1_JD	MIC IN (MIC_RIN/LIN) sense pin

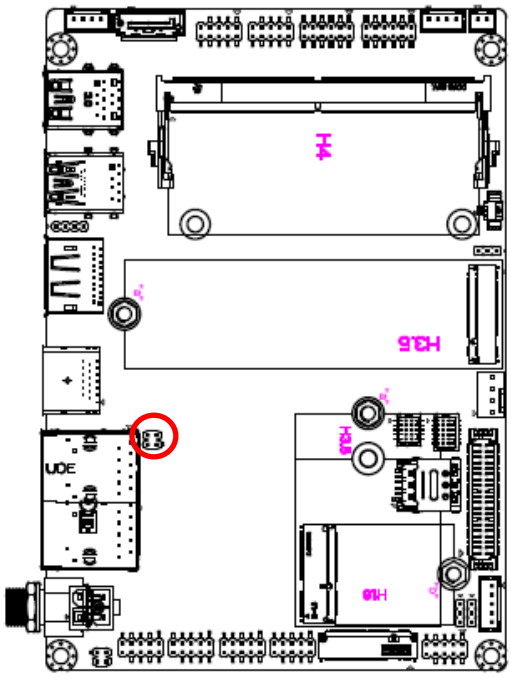
2.3.24 PD JTAG connector (JPDFW1)

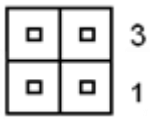




Signal	PIN
LDO_3V3	1
EEPROM_I2C_SCL	2
EEPROM_I2C_SDA	3
GND	4

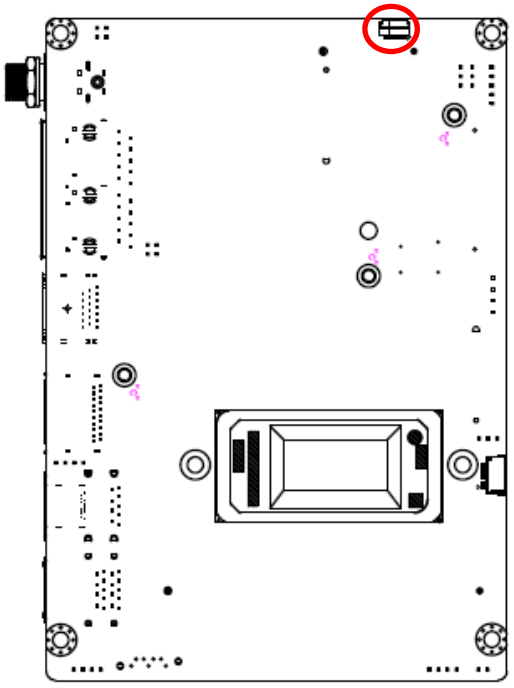
2.3.25 ACT LED connector (JACT_LED1)





Signal	PIN	PIN	Signal
LAN2_LED_ACT#	4	3	LAN1_LED_ACT_P_3
LAN1_LED_ACT#	2	1	LAN1_LED_ACT_P_1

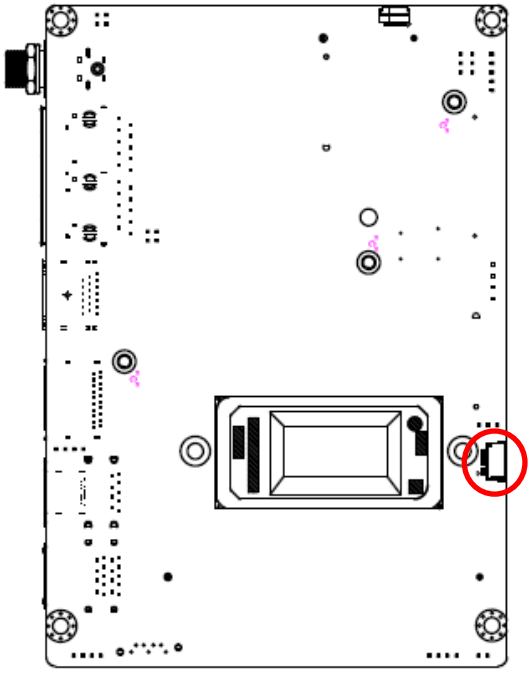
2.3.26 SIM card connector (J_N_SIM1)





Signal	PIN
+VCC_SIM	1
GND	2
UIM_RESET#	3
+VPP_SIM_1	4
GND	5
UIM_CLK	6
UIM_DATA	7
GND	8
N_SIM_CD_R	9
NC	10

2.3.27 PC connector (JPC1)



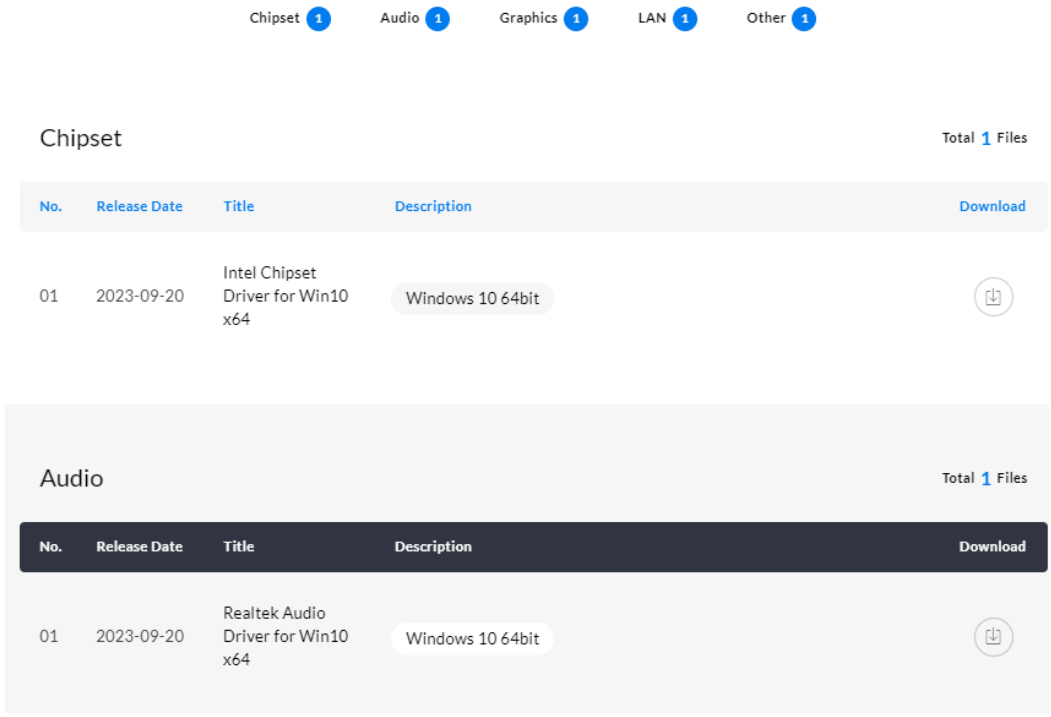


Signal	PIN
NC	6
+3.3VSB	5
VCCCORE_PMSCL	4
GND	3
VCCCORE_PMSDA	2
VCCCORE_nPMALERT	1

3. Drivers Installation

All the drivers are available on Avalue Downloads Area (https://www.avalue.com/en/support/download). Type the model name and press Enter to find all the relevant software, utilities, and documentation.

Note:
The panel PC with projected capacitive type touchscreen and Windows 7 (or later) OS does not require touch driver installation. This is because there is a HID touch digitizer built-in driver in Windows 7 or later.



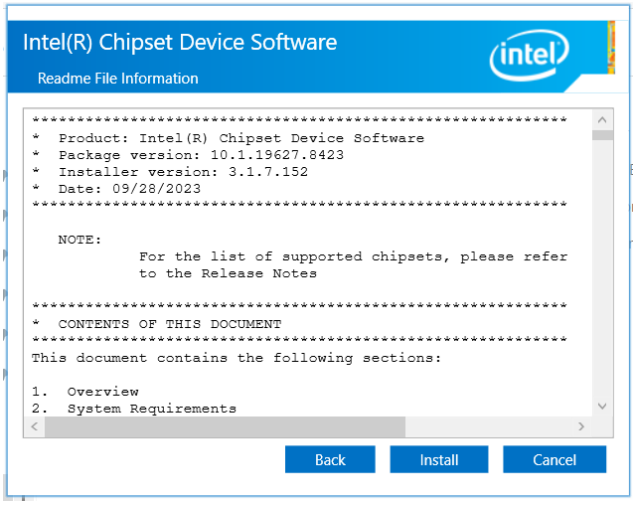
(For reference only)

Note: Installation procedures and screen shots in this section are for your reference and may not be exactly the same as shown on your screen.

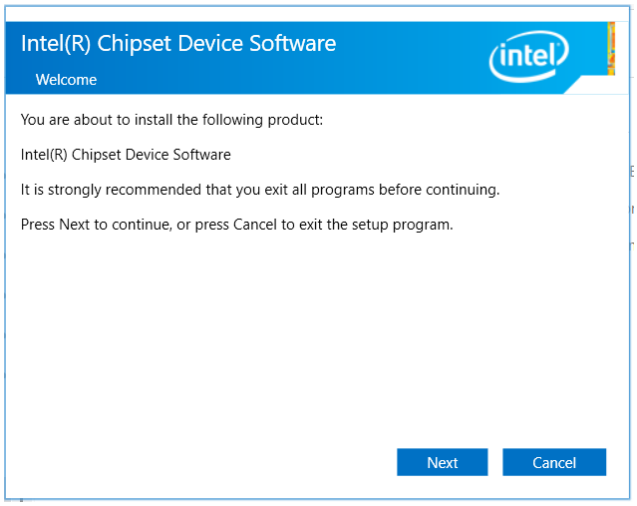
3.1 Install Chipset Driver

All drivers can be found on the Avalue Official Website: www.avalue.com.

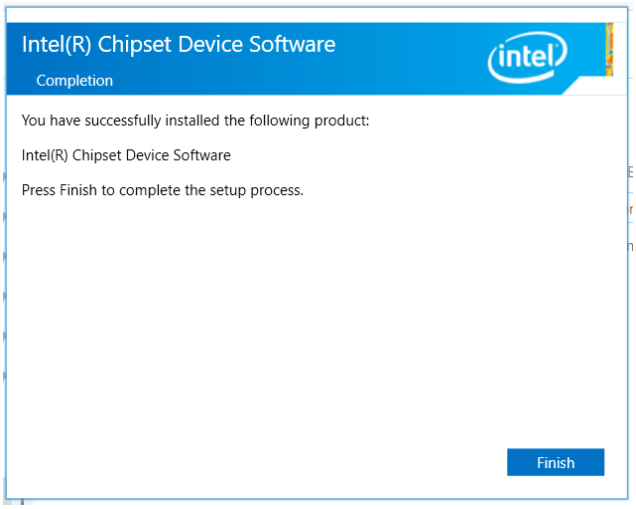
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



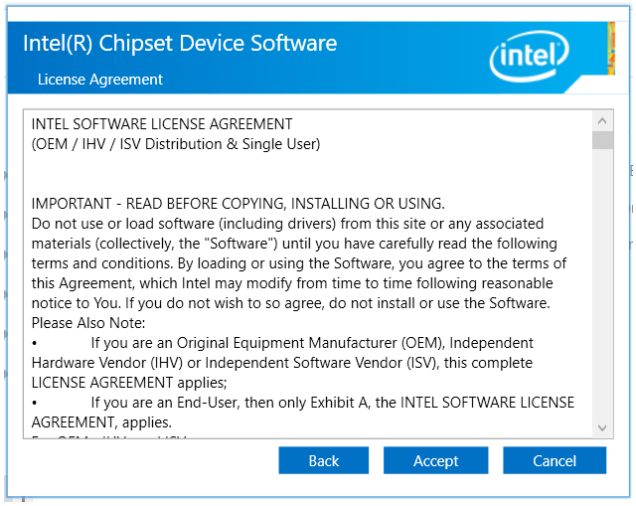
Step 3. Click **Install**.



Step1. Click **Next**.



Step 4. Click Finish to complete setup.

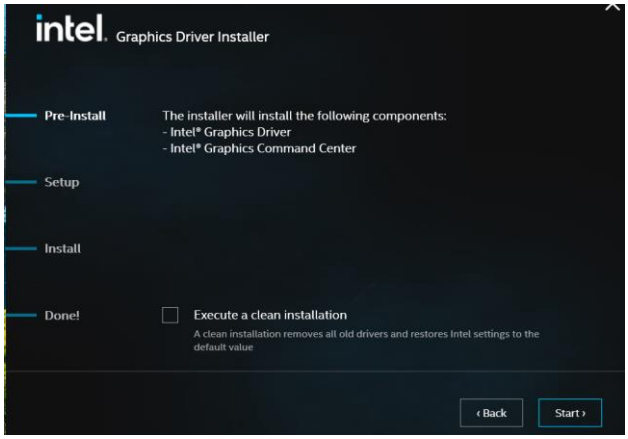


Step 2. Click **Accept**.

3.2 Install VGA Driver

All drivers can be found on the Avalue Official Website:
www.avalue.com.

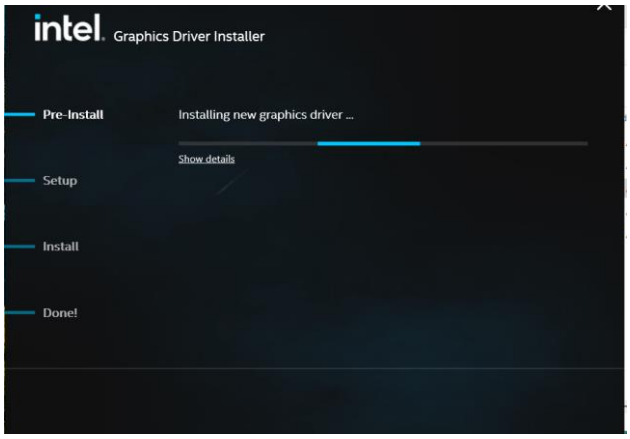
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



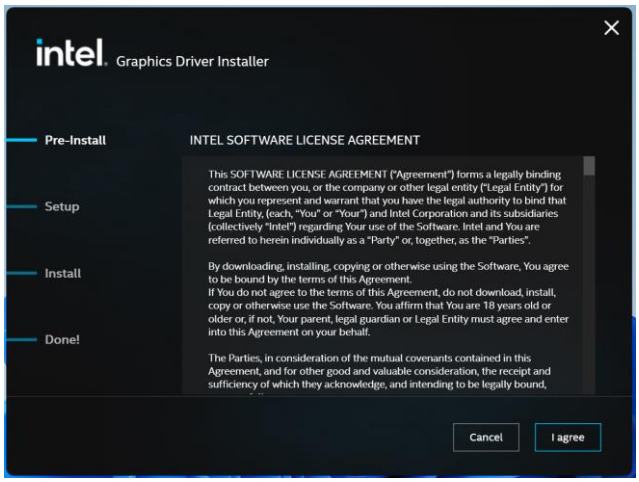
Step 3. Click **Start.**



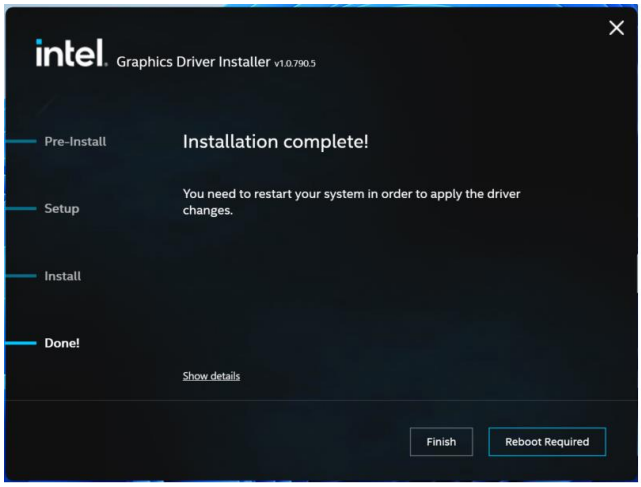
Step 1. Click **Begin installation**.



Step 4. Installing.



Step 2. Click **I agree**.



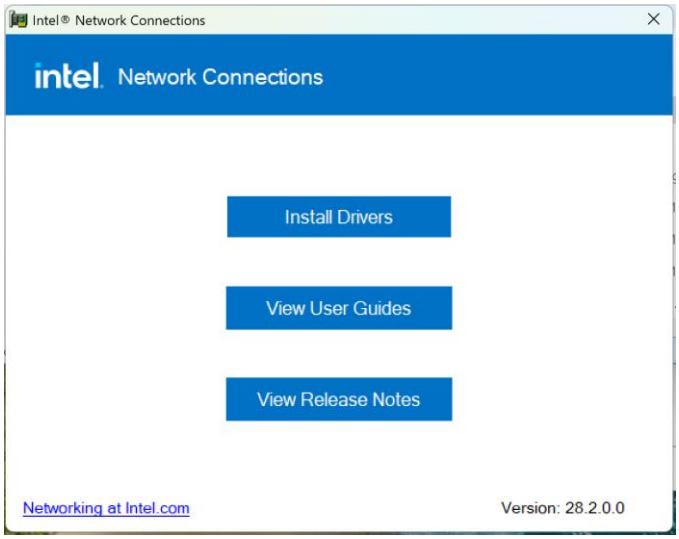
Step 5. Click **Finish** to complete setup.

3.3 Install Ethernet Driver

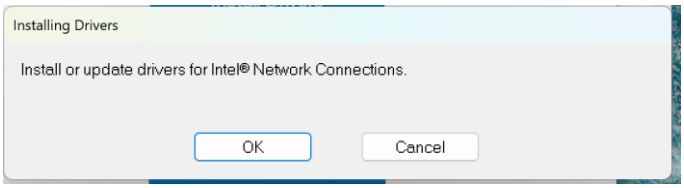
All drivers can be found on the Avalue Official Website:

www.avalue.com.

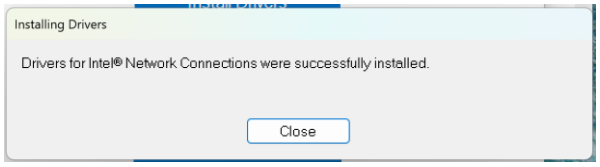
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



Step 1. Click **Install Drivers**.



Step 2. Click **OK**.



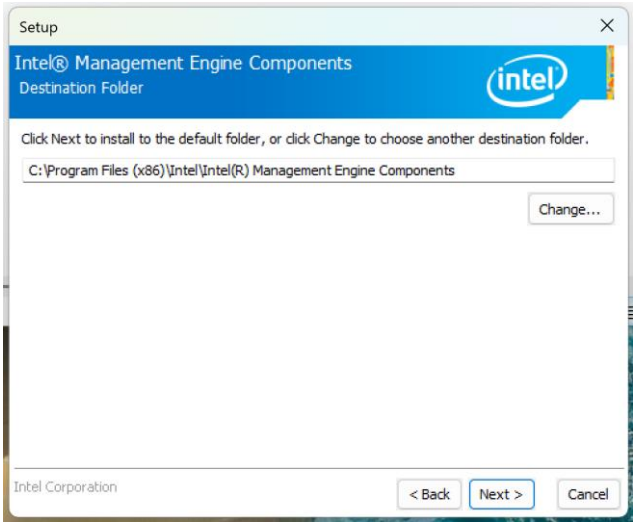
Step 3. Setup completed.

3.4 Install ME Driver

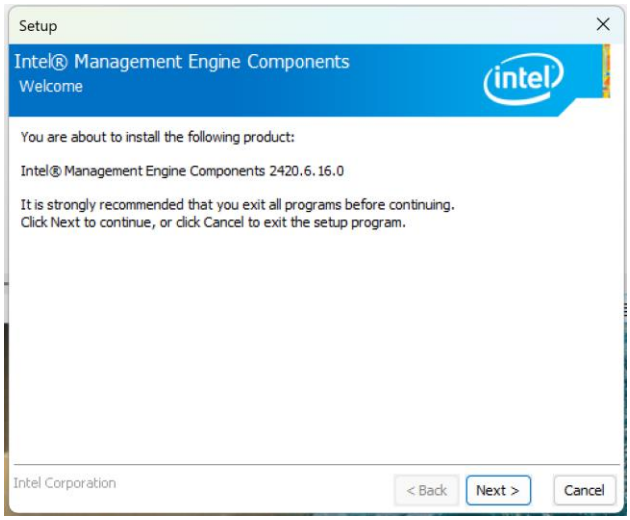
All drivers can be found on the Avalue Official Website:

www.avalue.com.

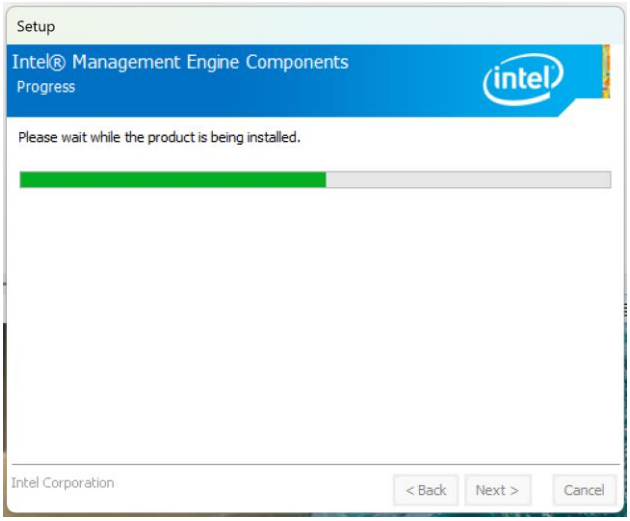
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



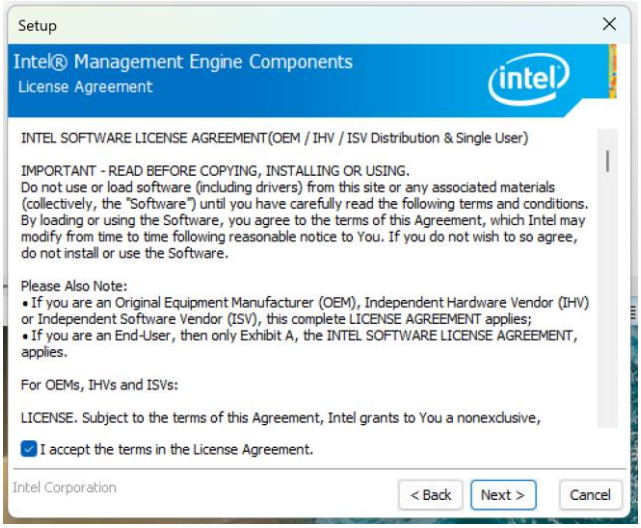
Step 3. Click **Next**.



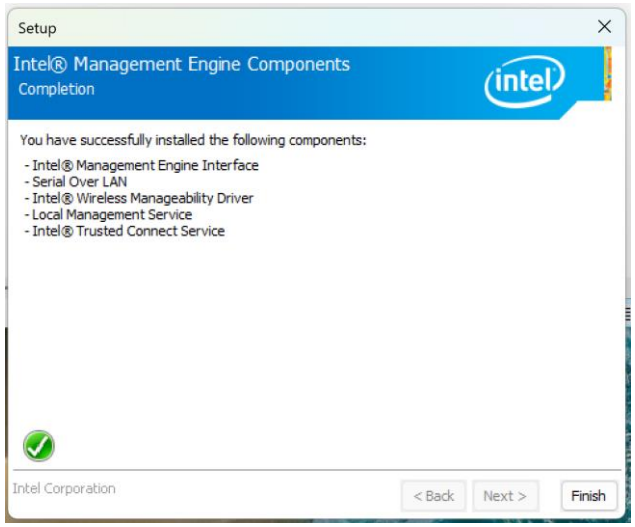
Step 1. Click **Next** to continue installation.



Step 4. Click **Next**.



Step 2. Click **Next**.



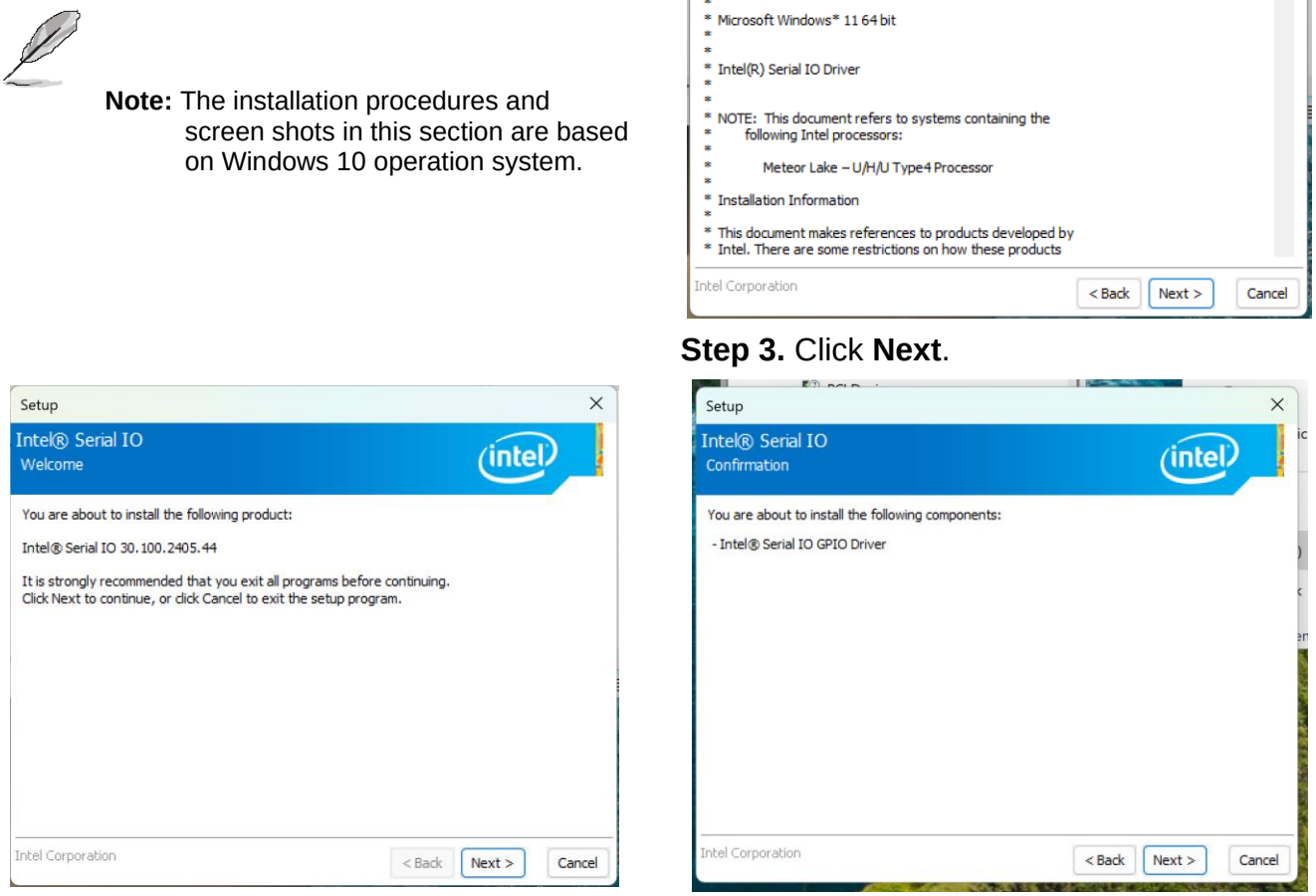
Step 5. Click **Finish** to complete setup.

3.5 Install Serial IO Driver

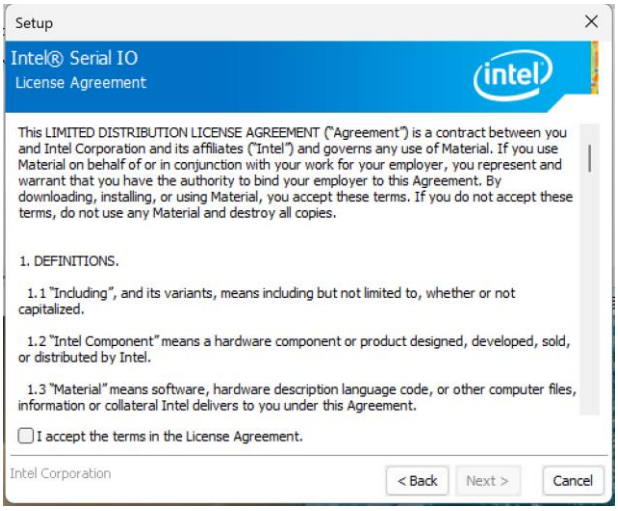
All drivers can be found on the Avalue Official Website:

www.avalue.com.

Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.

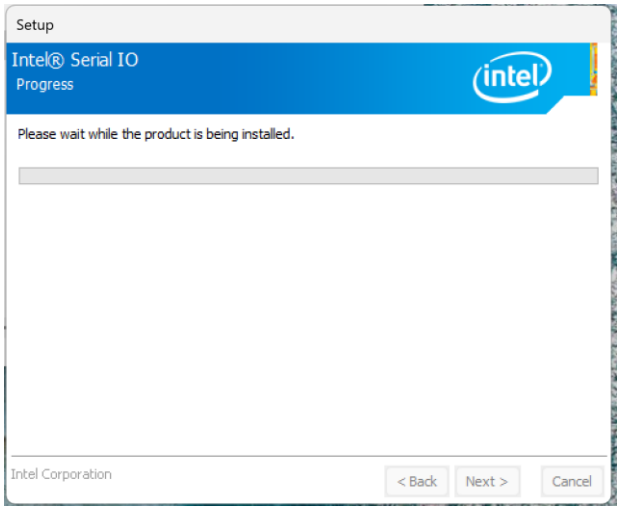


Step 1. Click **Next** to continue installation.

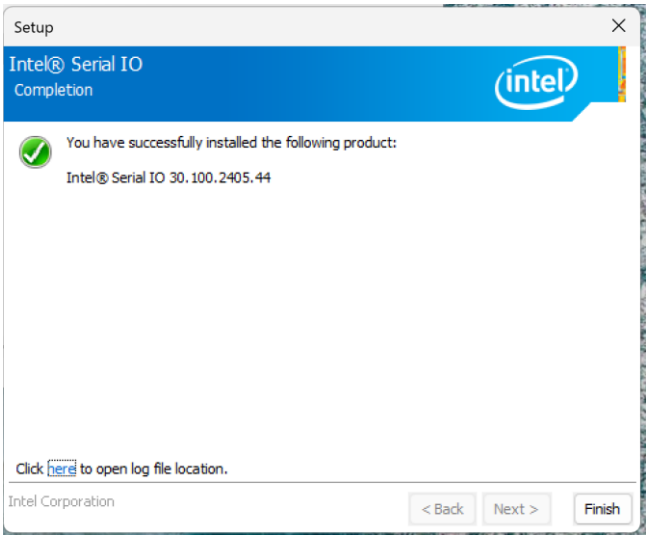


Step 2. Click **Next**.

Step 4. Click **Next**.



Step 5. Installing.

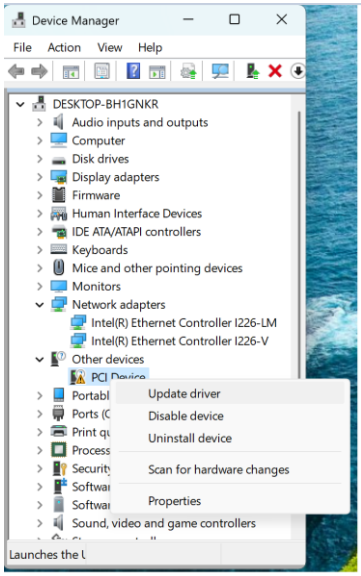


Step 6. Click Finish to complete setup.

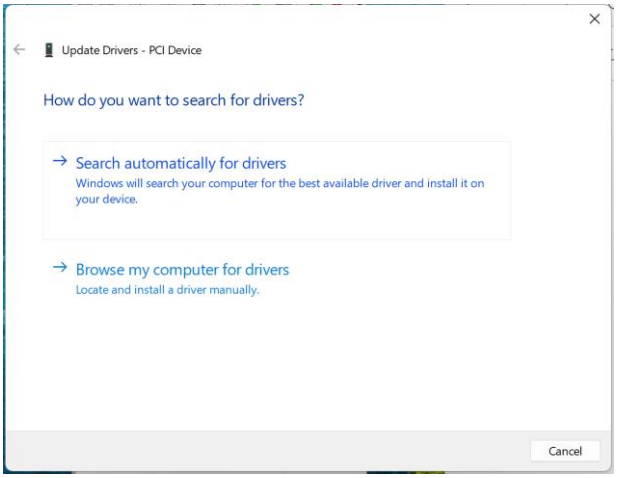
3.6 Install PCI Device Driver

All drivers can be found on the Avalue Official Website:
www.avalue.com.

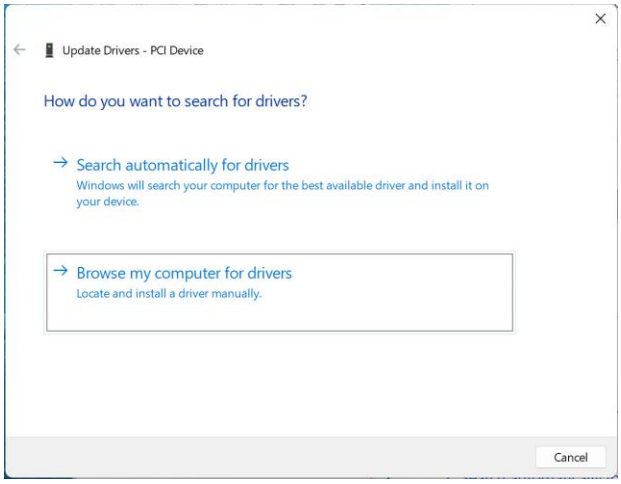
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



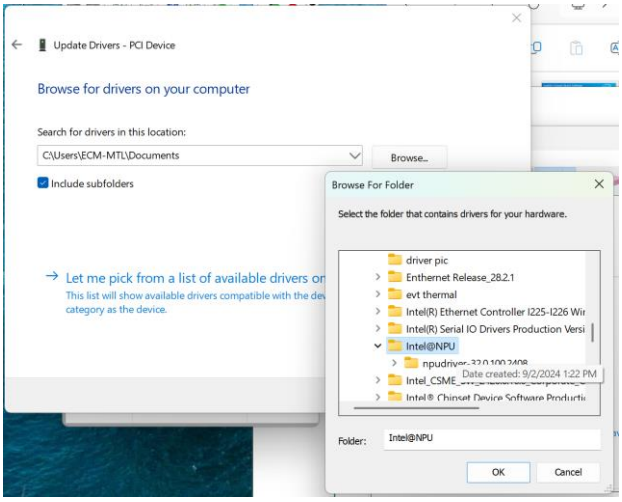
Step 1. Click **Update driver**.



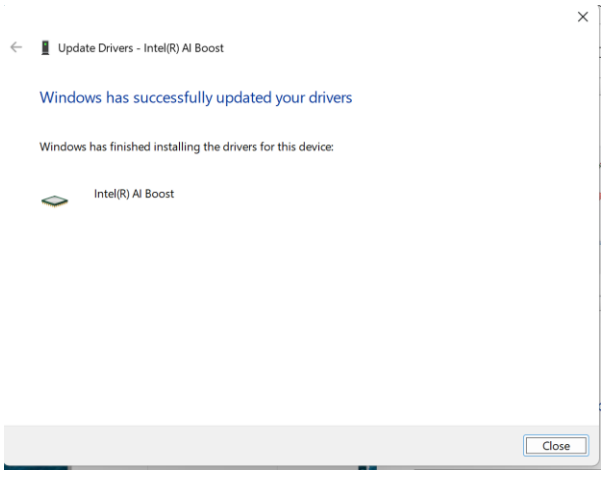
Step 2. Click **Search automatically for drivers**.



Step 3. Click **Browse my computer for drivers**.



Step 4. Installing.



Step 5. Setup completed.

4.BIOS Setup

4.1 Introduction

The BIOS setup program allows users to modify the basic system configuration. In this following chapter will describe how to access the BIOS setup program and the configuration options that may be changed.

4.2 Starting Setup

AMI BIOS™ is immediately activated when you first power on the computer. The BIOS reads the system information contained in the NVRAM and begins the process of checking out the system and configuring it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of two ways:
By pressing <ESC> or <Del> immediately after switching the system on, or
By pressing the < ESC> or <Del> key when the following message appears briefly at the left-top of the screen during the POST (Power On Self Test).

Press <ESC> or <Del> to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

4.3 Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Button	Description
↑	Move to previous item
↓	Move to next item
←	Move to the item in the left hand
→	Move to the item in the right hand
Esc key	Main Menu -- Quit and not save changes into NVRAM Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 key	Previous Values
F3 key	Optimized defaults
F4 key	Save & Exit Setup

- **Navigating Through The Menu Bar**

  Use the left and right arrow keys to choose the menu you want to be in.



Note: Some of the navigation keys differ from one screen to another.

- **To Display a Sub Menu**

  Use the arrow keys to move the cursor to the sub menu you want. Then press <Enter>. A "➢" pointer marks all sub menus.

4.4 Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> or the <Enter> key again.

4.5 In Case of Problems

If, after making and saving system changes with Setup, you discover that your computer no longer is able to boot, the AMI BIOS supports an override to the NVRAM settings which resets your system to its defaults.

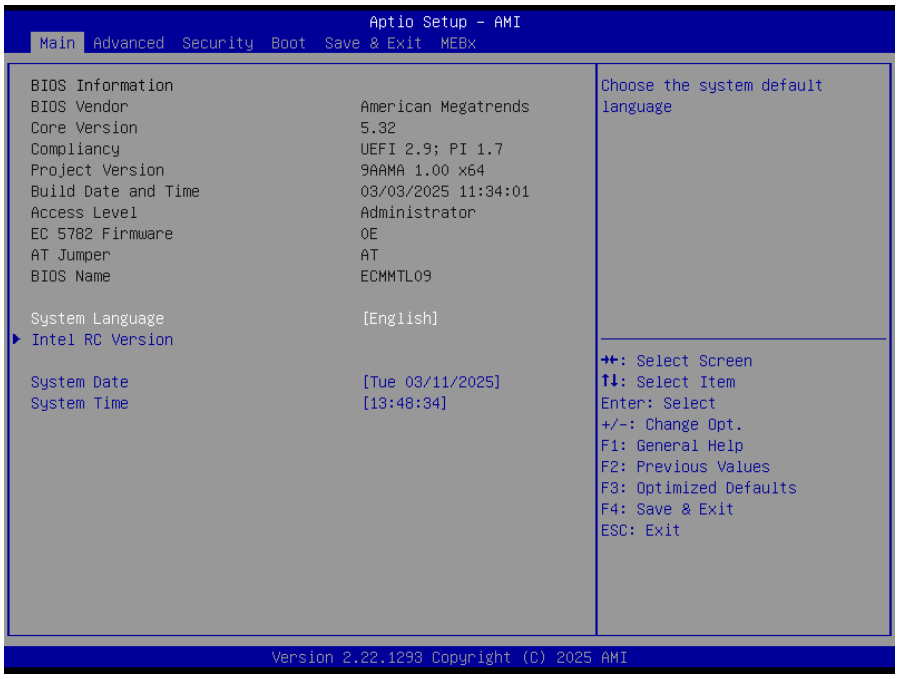
The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both BIOS Vendor and your systems manufacturer to provide the absolute maximum performance and reliability. Even a seemingly small change to the chipset setup has the potential for causing you to use the override.

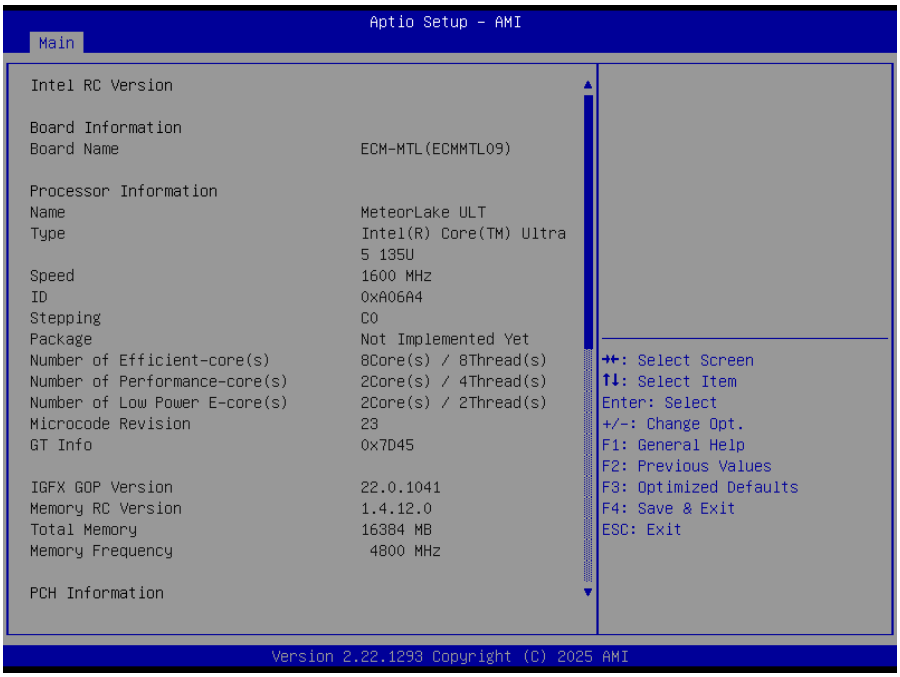
4.6 BIOS setup

Once you enter the Aptio Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and exit choices. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.

4.6.1 Main Menu

This section allows you to record some basic hardware configurations in your computer and set the system clock.





4.6.1.1 System Language

This option allows choosing the system default language.

4.6.1.2 System Date

Use the system date option to set the system date. Manually enter the Month, day and year.

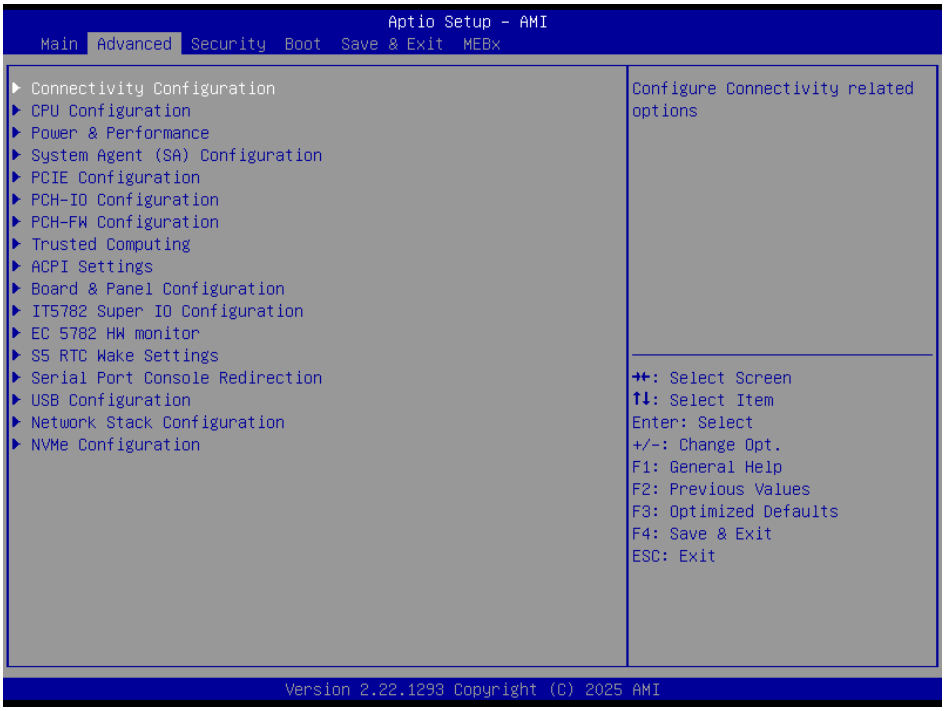
4.6.1.3 System Time

Use the system time option to set the system time. Manually enter the hours, minutes and seconds.

Note: The BIOS setup screens shown in this chapter are for reference purposes only, and may not exactly match what you see on your screen.
Visit the Avalue website (www.avalue.com) to download the latest product and BIOS information.

4.6.2 Advanced Menu

This section allows you to configure your CPU and other system devices for basic operation through the following sub-menus.



4.6.2.1 Connectivity Configuration



Item	Options	Description
CNVi Mode	Disable Integrated Auto Detection**[Default]**	This option configures Connectivity. [Auto Detection] means that if Discrete solution is discovered it will be enabled by default. Otherwise Integrated solution (CNVi) will be enabled; [Disable Integrated] disables Integrated Solution. NOTE: When CNVi is present, the GPIO pins that are used for radio.

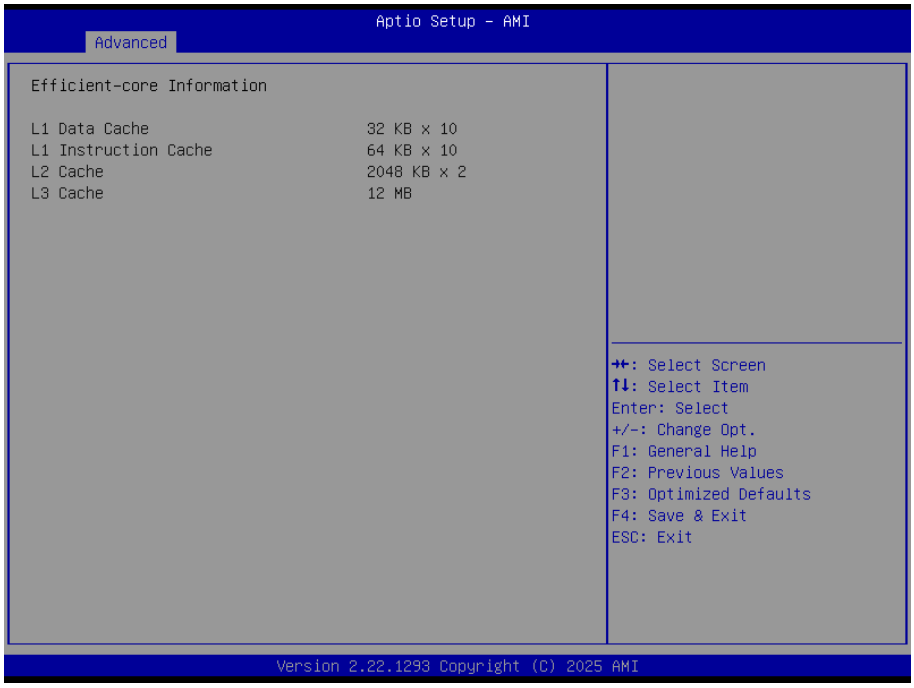
4.6.2.2 CPU Configuration

Use the CPU configuration menu to view detailed CPU specification and configure the CPU.

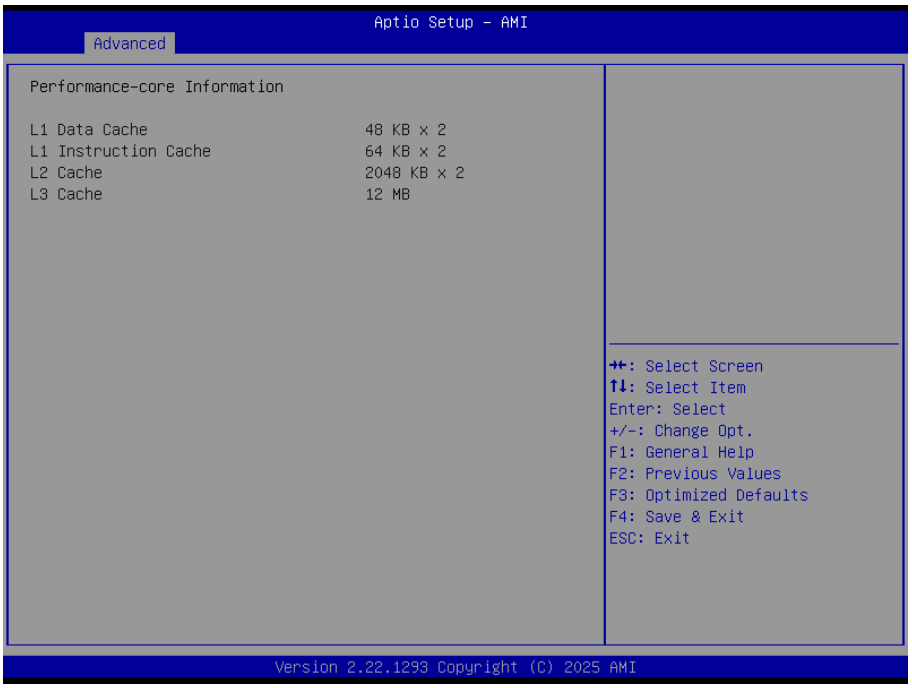


Item	Options	Description
Intel (VMX) Virtualization Technology	Disabled Enabled**[Default]**	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Performance-cores	All**[Default]** 1	Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores.
Active Efficient-cores	All**[Default]** 7 6 5 4 3 2 1 0	Number of E-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores.

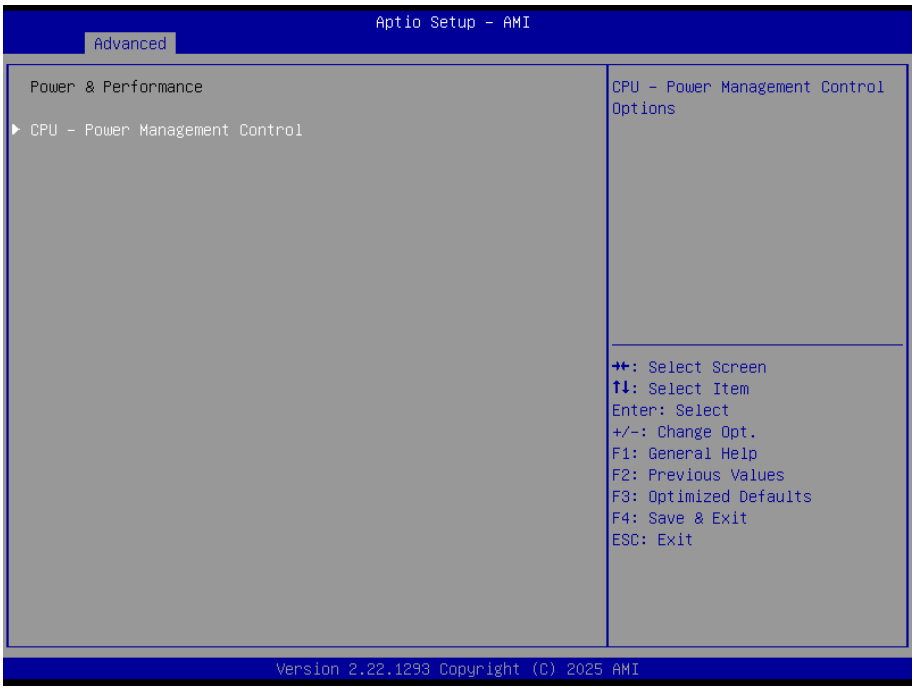
4.6.2.2.1 Efficient-core Information



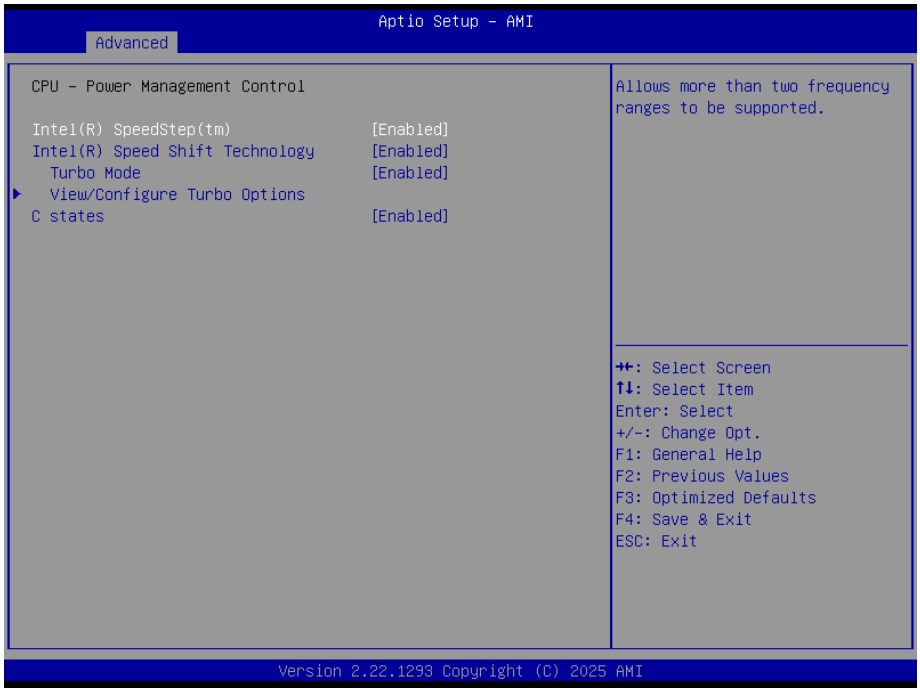
4.6.2.2.2 Performance-core Information



4.6.2.3 Power & Performance

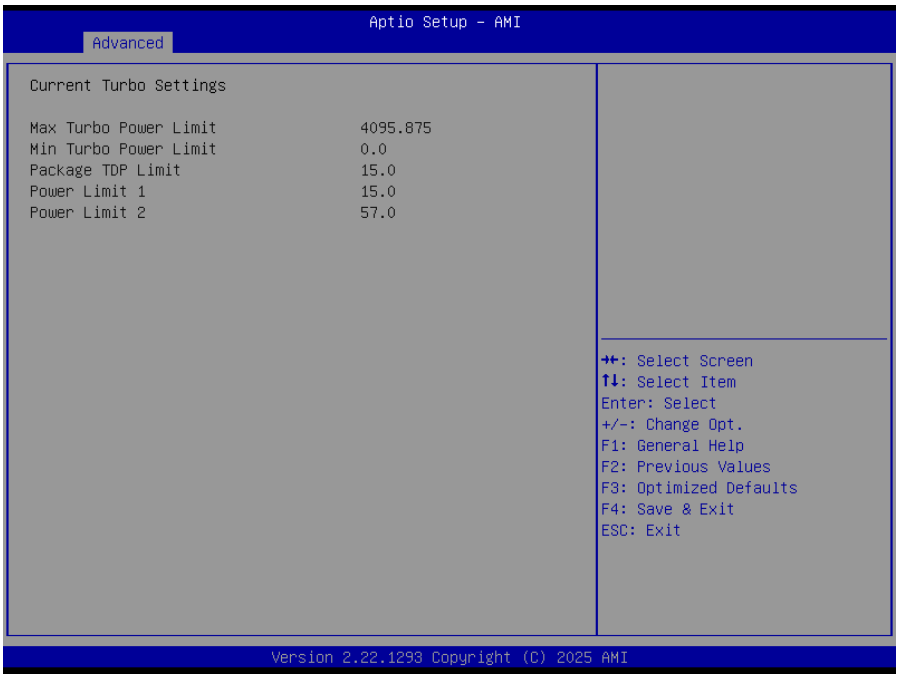


4.6.2.3.1 CPU – Power Management Control

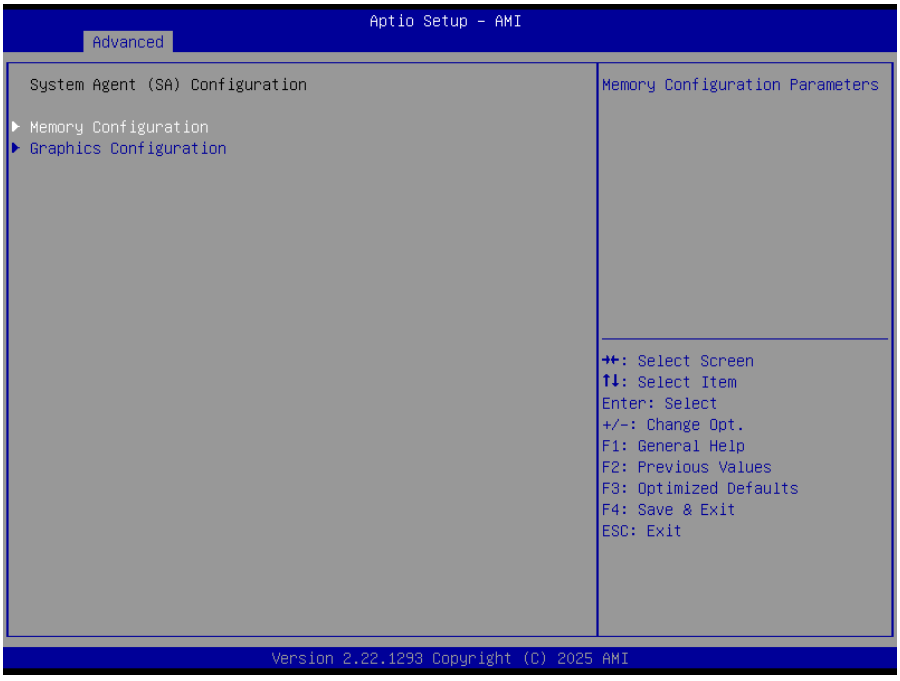


Item	Option	Description
Intel® SpeedStep™	Enabled**[Default]**, Disabled	Allows more than two frequency ranges to be supported.
Intel® Speed Shift Technology	Enabled**[Default]**, Disabled	Eanble/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Turbo Mode	Enabled**[Default]**, Disabled	Enable/Disable processor Turbo Mode.
C States	Enabled**[Default]**, Disabled	Enable/Disable CPU Power Management.

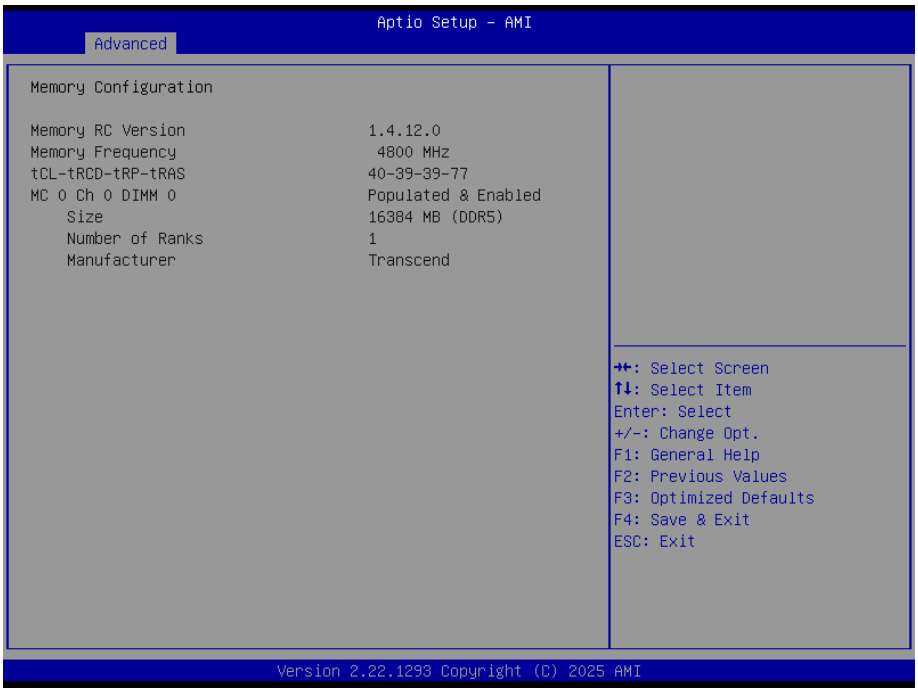
4.6.2.3.1.1 View/Configure Turbo Options



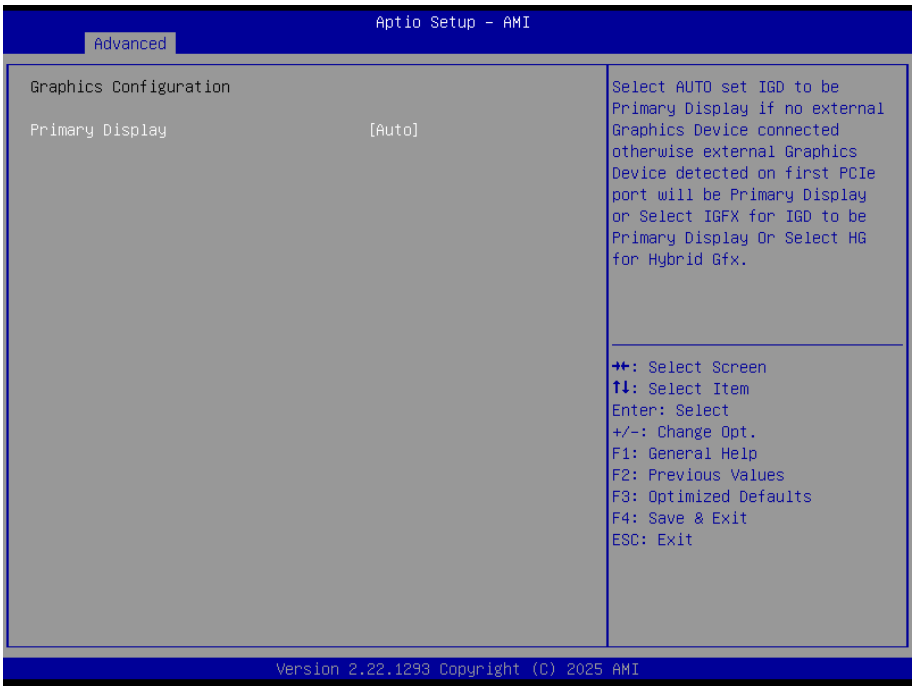
4.6.2.4 System Agent (SA) Configuration



4.6.2.4.1 Memory Configuration

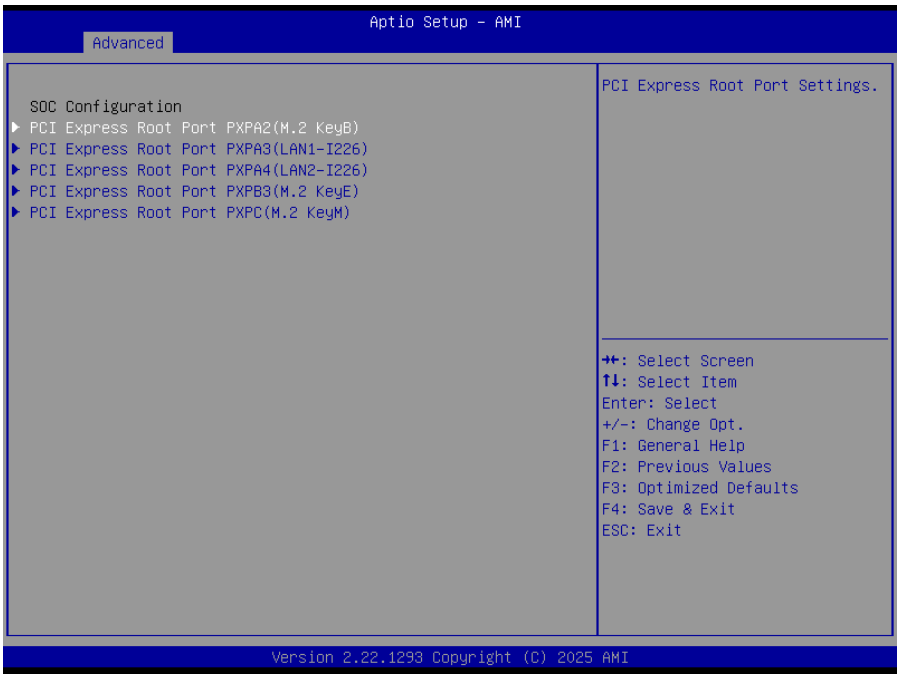


4.6.2.4.2 Graphics Configuration

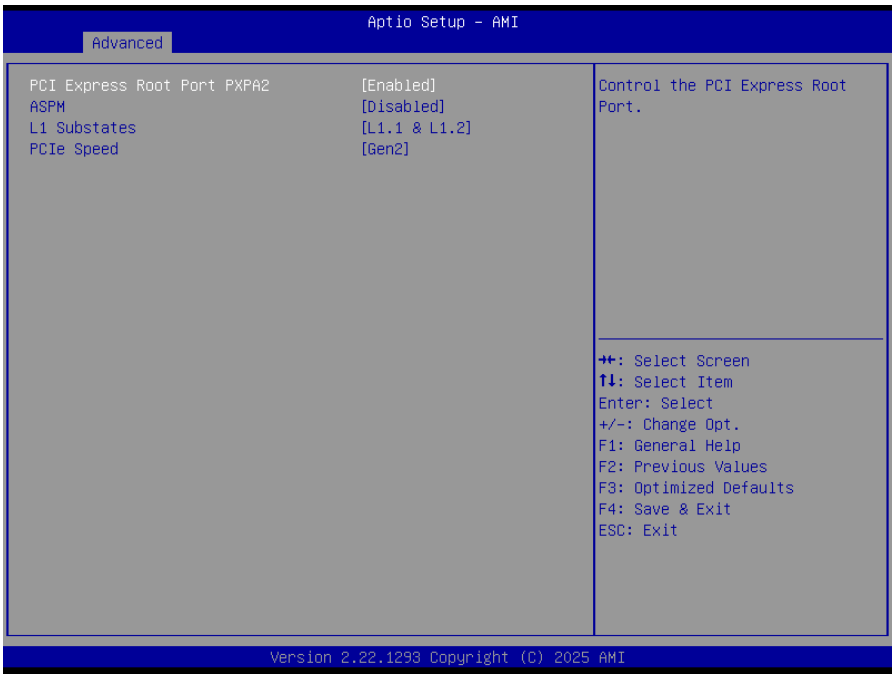


Item	Option	Description
Primary Display	Auto**[Default]**, IGFX	Select AUTO set IGD to be Primary Display if no external Graphis Device connected otherwise external Graphics Device detected on first PCIe port will be Primary Display or Select IFGX for IGD to be Primary Display Or Select HG for Hybrid Gfx.

4.6.2.5 PCIE Configuration



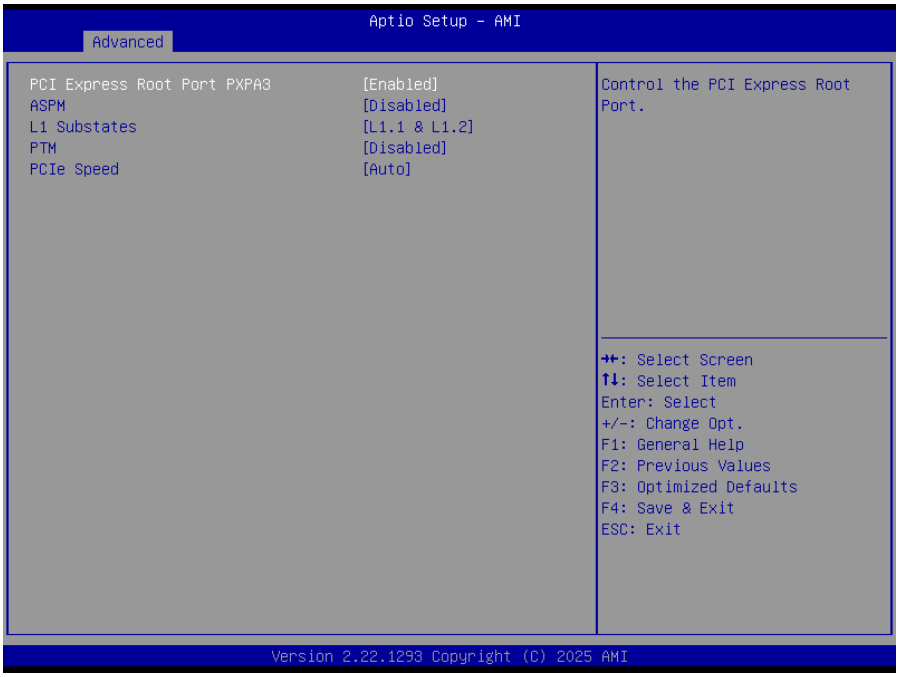
4.6.2.5.1 PCI Express Root Port PXPA2(M.2 KeyB)



Item	Option	Description
PCI Express Root Port PXPA2	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.

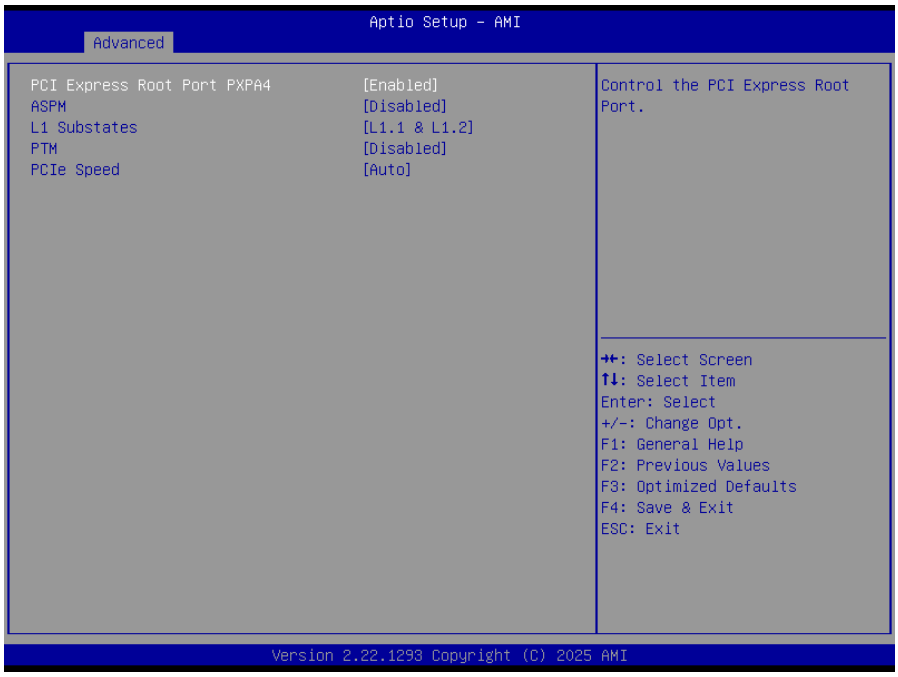
L1 Substates	Disabled L1.1 L1.1 & L1.2**[Default]**	PCI Express L1 Substates settings.
PCIe Speed	Gen1 Gen2**[Default]**	Configure PCIe Speed.

4.6.2.5.2 PCI Express Root Port PXPA3(LAN1-I226)



Item	Option	Description
PCI Express Root Port PXPA3	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled L1.1 L1.1 & L1.2**[Default]**	PCI Express L1 Substates settings.
PTM	Disabled**[Default]**, Enabled	Enable/Disable Precision Time Measurement.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed.

4.6.2.5.3 PCI Express Root Port PXPA4(LAN2-I226)



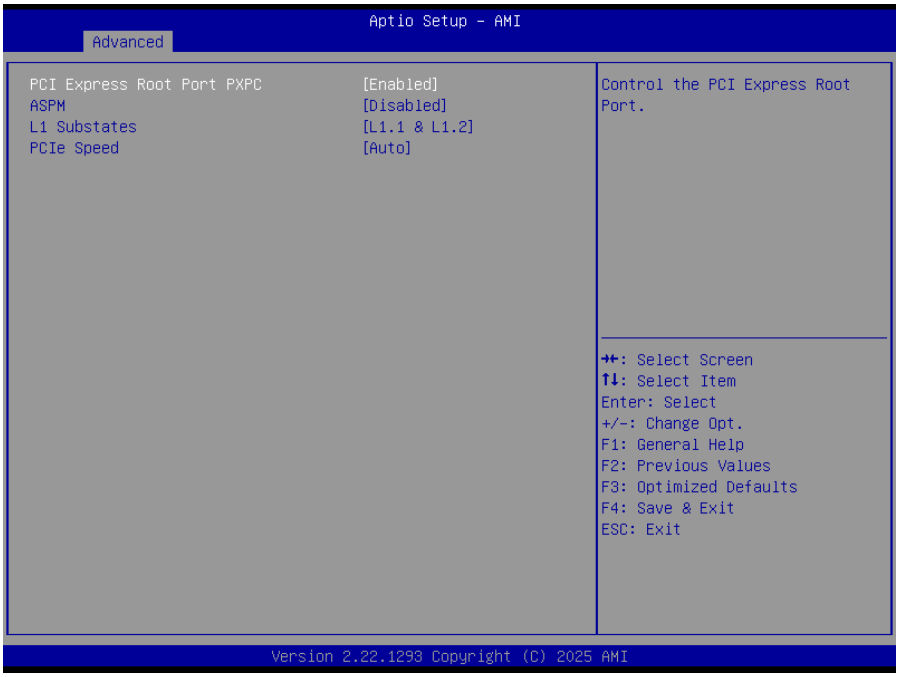
Item	Option	Description
PCI Express Root Port PXPA4	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled L1.1 L1.1 & L1.2**[Default]**	PCI Express L1 Substates settings.
PTM	Disabled**[Default]**, Enabled	Enable/Disable Precision Time Measurement.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed.

4.6.2.5.4 PCI Express Root Port PXPB3(M.2 KeyE)



Item	Option	Description
PCI Express Root Port PXPB3	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled L1.1 L1.1 & L1.2**[Default]**	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed.

4.6.2.5.5 PCI Express Root Port PXPC(M.2 KeyM)

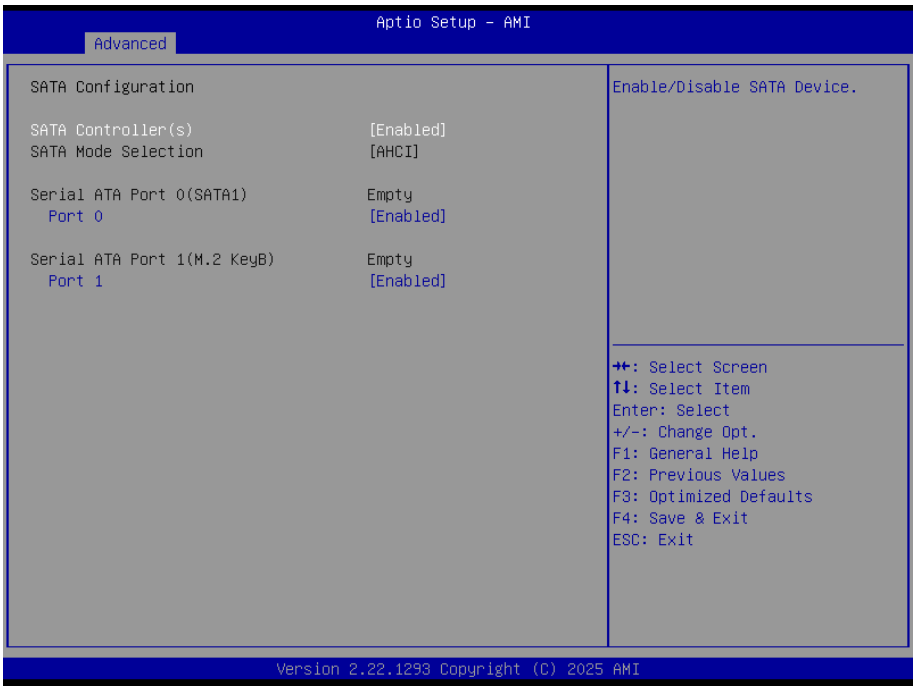


Item	Option	Description
PCI Express Root Port PXPC	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled L1.1 L1.1 & L1.2**[Default]**	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed.

4.6.2.6 PCH-IO Configuration

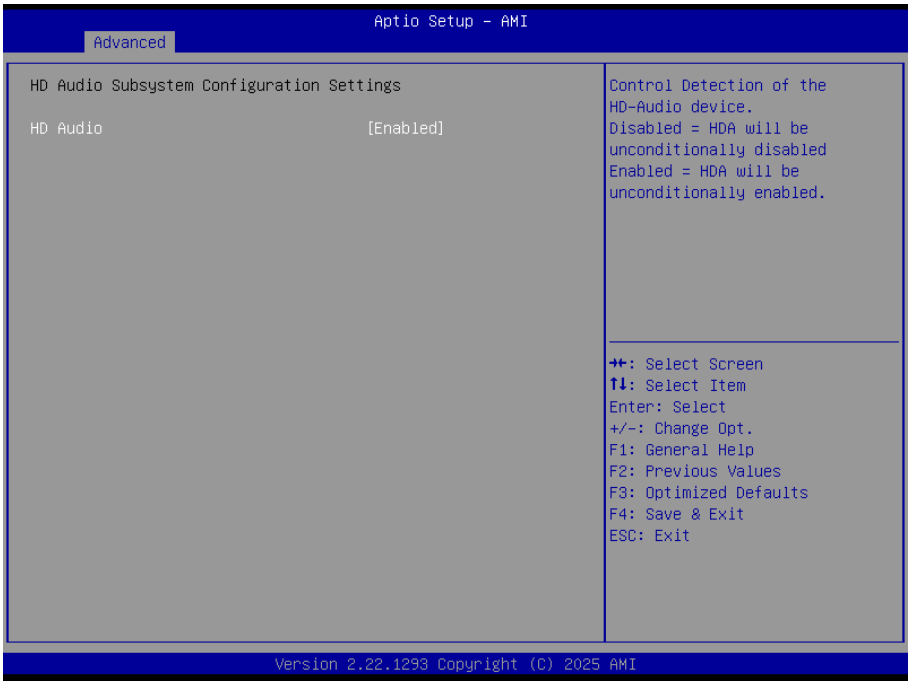


4.6.2.6.1 SATA Configuration



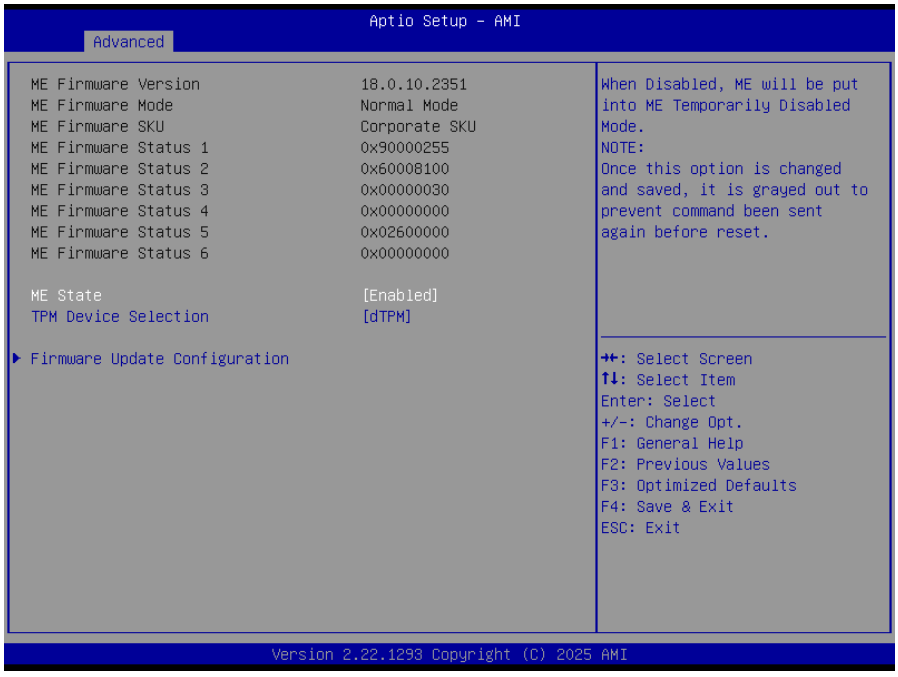
Item	Options	Description
SATA Controller(s)	Enabled**[Default]** Disabled,	Enable/Disable SATA Device.
Port 0	Enabled**[Default]** Disabled	Enable or Disable SATA Port.
Port 1	Enabled**[Default]** Disabled	Enable or Disable SATA Port.

4.6.2.6.2 HD Audio Configuration



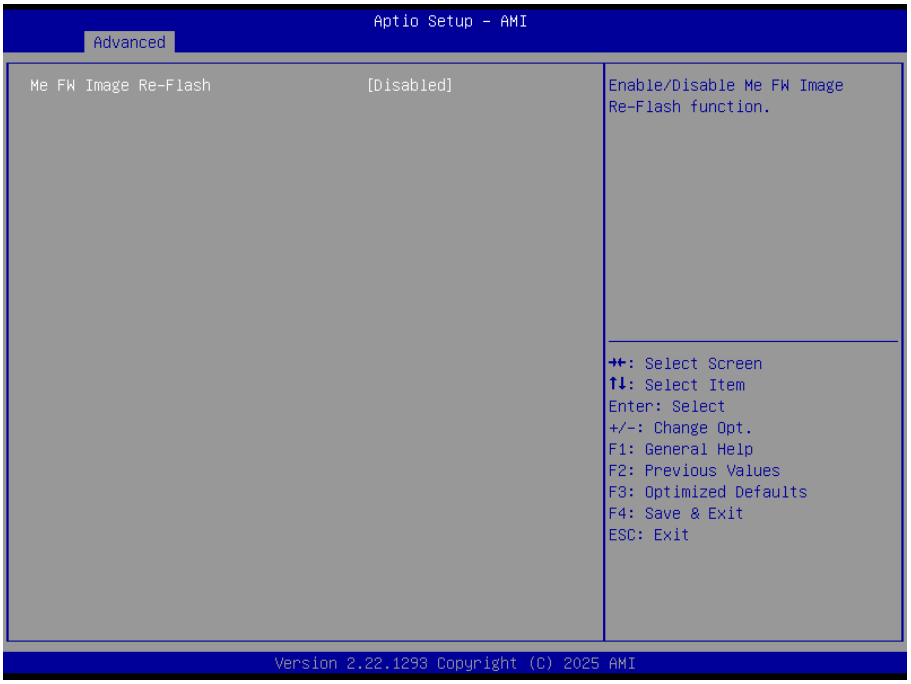
Item	Option	Description
HD Audio	Disabled Enabled**[Default]**	Control Detection of the HD-Audio device. Disable = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled.

4.6.2.7 PCH-FW Configuration



Item	Option	Description
ME State	Disabled Enabled**[Default]**,	When Disabled ME will be put into ME Temporarily Disabled Mode.
TPM Device Selection	dTPM**[Default]** PTT	Select TPM device: PTT or dTPM. PTT-Enables PTT in SkuMgr dTPM 1.2- Disables PTT in SkuMgr Warning! PTT/dTPM will be disabled and all data saved on it will be lost.

4.6.2.7.1 Firmware Update Configuration



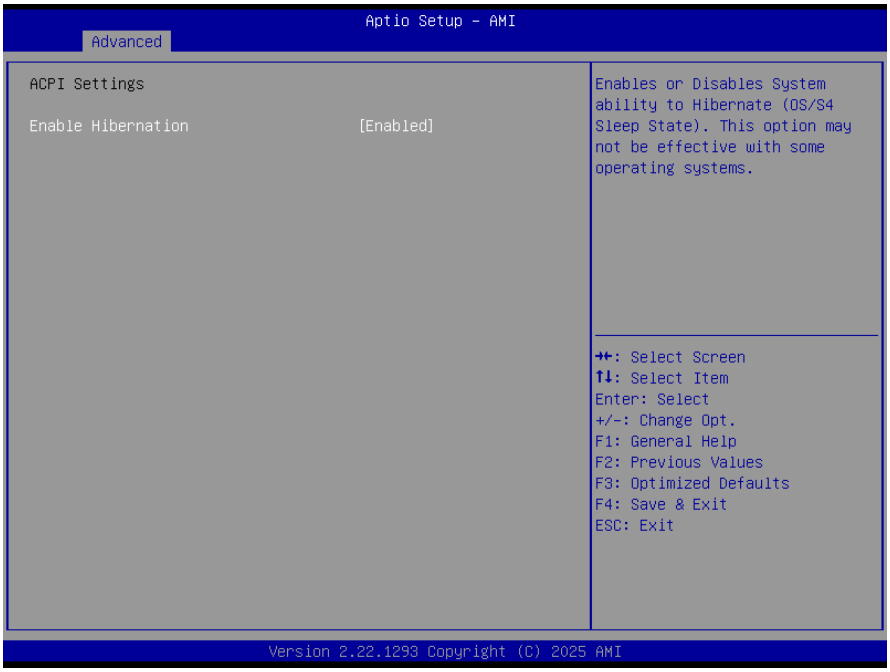
Item	Option	Description
ME FW Image Re-Flash	Disabled**[Default]**, Enabled	Enable/Disable Me FW Image Re-Flash function.

4.6.2.8 Trusted Computing



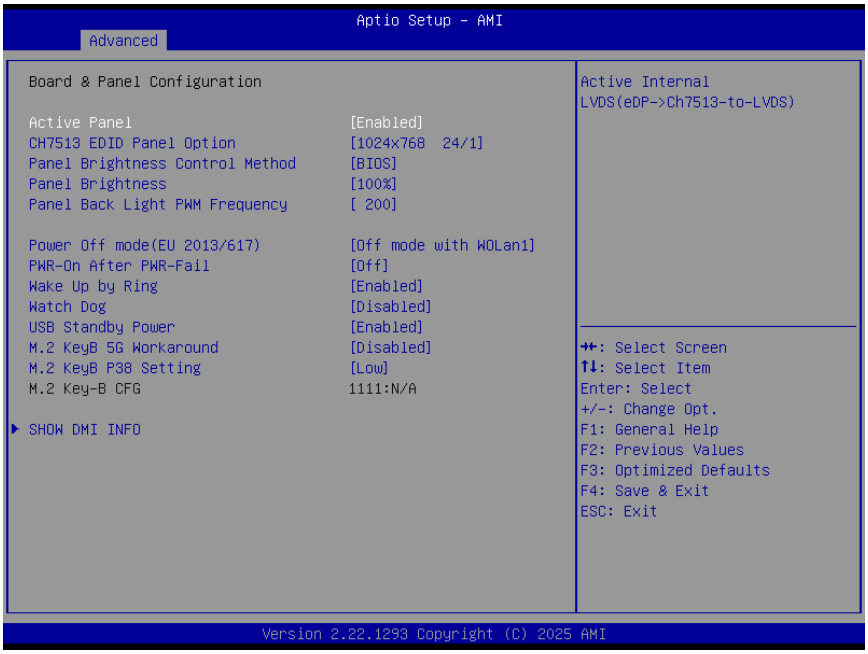
Item	Options	Description
Security Device Support	Disable, Enable**[Default]**	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

4.6.2.9 APCI Settings



Item	Options	Description
Enable Hibernation	Disabled Enabled**[Default]**,	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some OS.

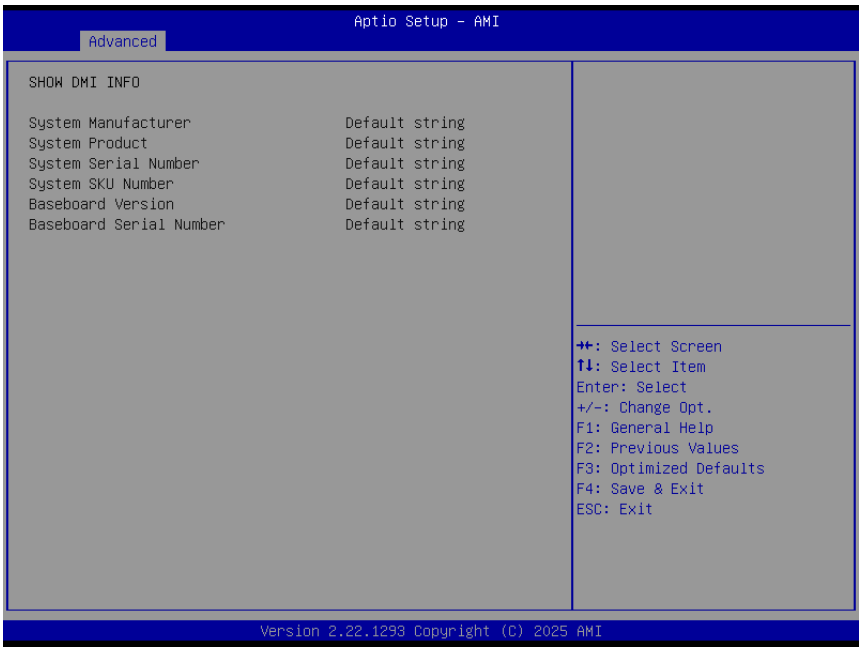
4.6.2.10 Board & Panel Configuration



Item	Option	Description
Active Panel	Disabled Enabled**[Default]**	Active Internal LVDS(eDP->Ch7513-to-LVDS).
CH7513 EDID Panel Option	1024x768 24/1**[Default]** 800x600 18/1 1024x768 18/1 1366x768 18/1 1024x600 18/1 1280x800 18/1 1920x1200 24/2 1920x1080 18/2 1280x1024 24/2 1440x900 18/2 1600x1200 24/2 1366x768 24/1 1920x1080 24/2 7513-eDP	Port-EDP to LVDS(Chrotel 7513) Panel EDID Option.
Panel Brightness Control Method	BIOS**[Default]** OS Driver	Panel Brightness Control Method. 1.BIOS 2.OS Driver.
Panel Brightness	00% 25% 50% 75% 100%**[Default]**	Select Panel(eDP/LVDS) back light PWM duty.
Panel Back Light PWM Frequency	200**[Default]** 1k 10k 20k	Select Panel(eDP/LVDS) back light PWM Frequency.
Power Off mode(EU 2013/617)	traditional S5 Off mode with WOLan1**[Default]** Off mode w/o WOL(ErP)	Power Off mode(EU 2013/617). Off mode with WOLan : Wakeup from Lan1/PWR button. Off mode w/o

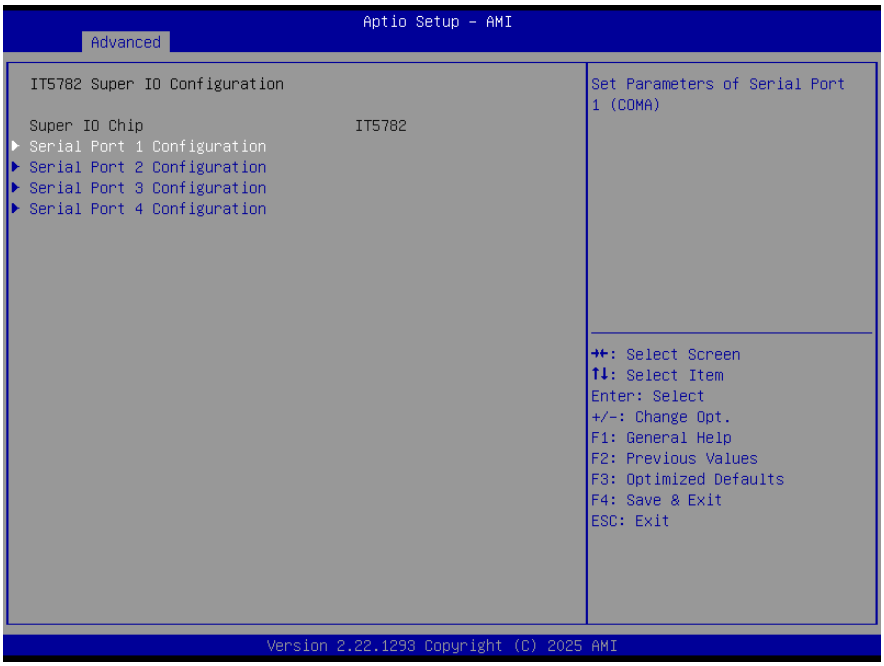
		WOL(ErP) : Wakeup from PWR button.
PWR-On After PWR-Fail	Off**[Default]** On Last state	AC loss resume.
Wake Up by Ring	Disabled Enabled**[Default]**	Wake Up by Ring from S4/S5.
Watch Dog	Disabled**[Default]** 30 sec 40 sec 50 sec 1 min 2 min 10 min 30 min	Select WatchDog.
USB Standby Power	Disabled Enabled**[Default]**	Enable/Disabled USB Standby Power during S4/S5.
M.2 KeyB 5G Workaround	Disabled**[Default]** Enabled	Enable/Disabled M.2 KeyB 5G Card Workaround.
M.2 KeyB P38 Setting	Low**[Default]** High	Set M.2 KeyB Pin38(DEVSLP) as Low/High.

4.6.2.10.1 SHOW DMI INFO



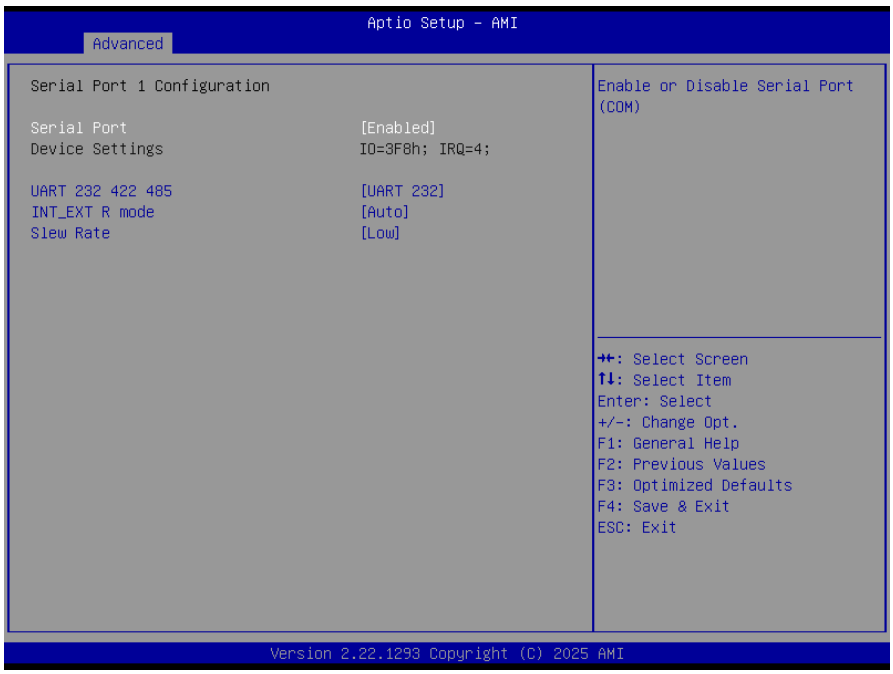
4.6.2.11 IT5782 Super IO Configuration

You can use this item to set up or change the IT5782 Super IO configuration for serial ports. Please refer to 4.6.2.11.1 ~ 4.6.2.11.4 for more information.



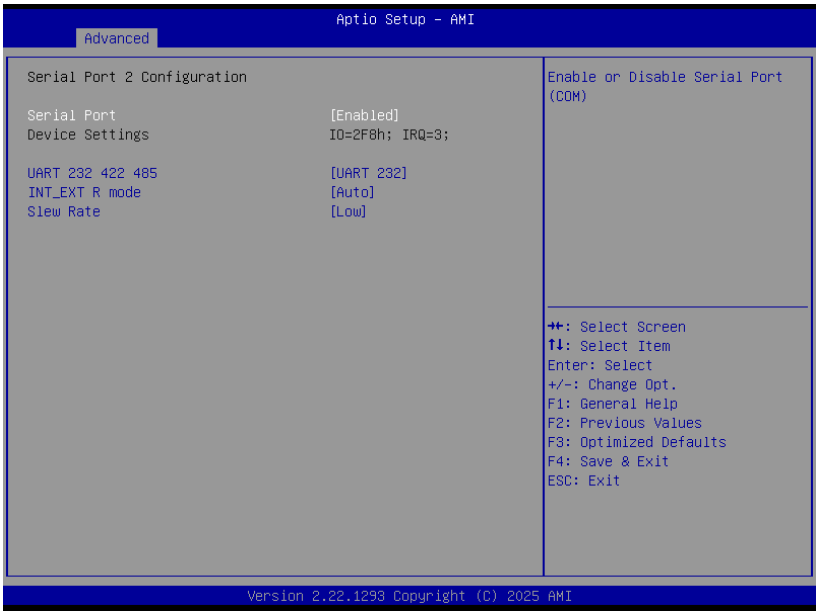
Item	Description
Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Set Parameters of Serial Port 2 (COMB).
Serial Port 3 Configuration	Set Parameters of Serial Port 3 (COMC).
Serial Port 4 Configuration	Set Parameters of Serial Port 4 (COMD).

4.6.2.11.1 Serial Port 1 Configuration



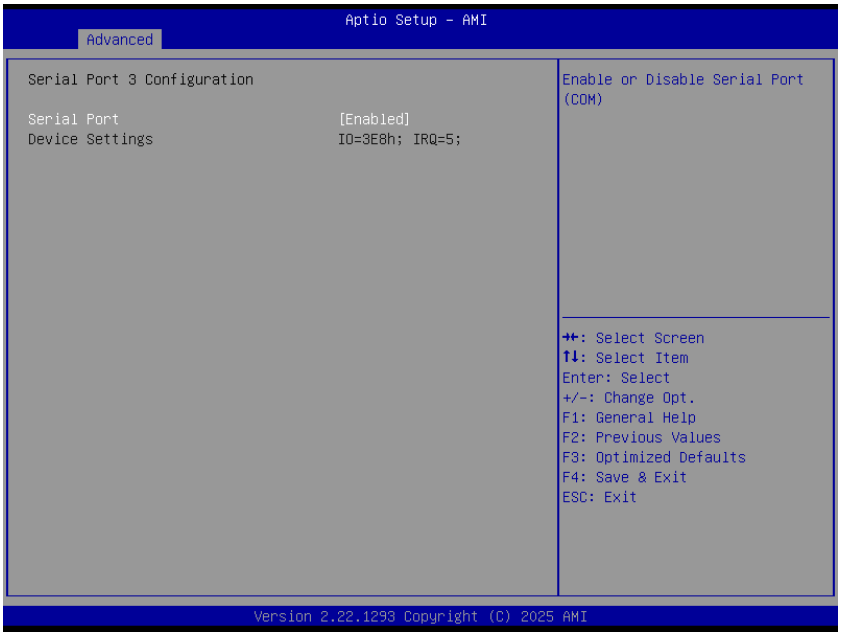
Item	Option	Description
Serial Port	Enabled**[Default]**, Disabled	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232**[Default]** UART 422 UART 485	Change the Serial Port as RS232/422/485.
INT_EXT R mode	Auto**[Default]** Non INT+EXT R EXT R INT R INT+EXT R	Enable switches for internal and external resistors.
Slew Rate	Low**[Default]** High	Low:RS232/422/485 = 250kbps. High:RS232 = 3Mbps, RS422/485 = 20Mbps.

4.6.2.11.2 Serial Port 2 Configuration



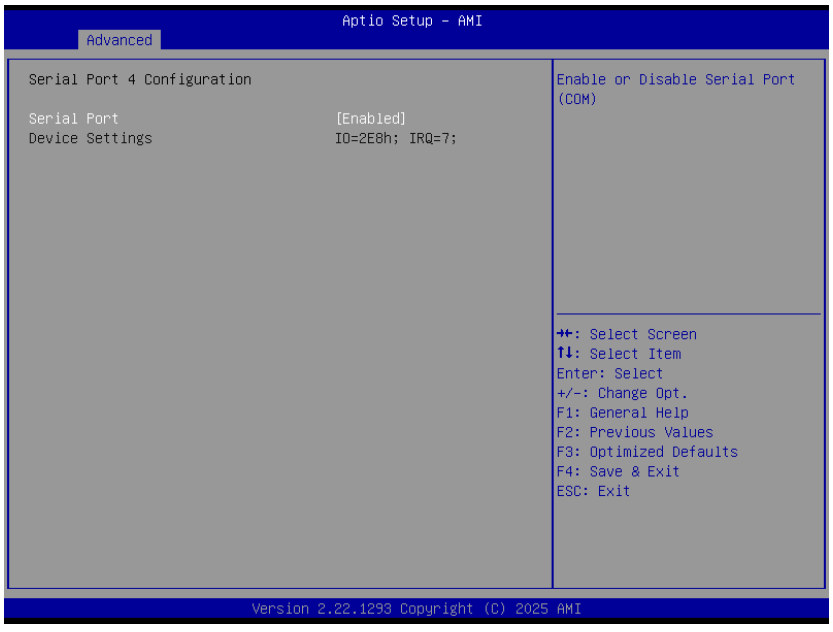
Item	Option	Description
Serial Port	Enabled**[Default]**, Disabled	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232**[Default]** UART 422 UART 485	Change the Serial Port as RS232/422/485.
INT_EXT R mode	Auto**[Default]** Non INT+EXT R EXT R INT R INT+EXT R	Enable switches for internal and external resistors.
Slew Rate	Low**[Default]** High	Low:RS232/422/485 = 250kbps. High:RS232 = 3Mbps, RS422/485 = 20Mbps.

4.6.2.11.3 Serial Port 3 Configuration



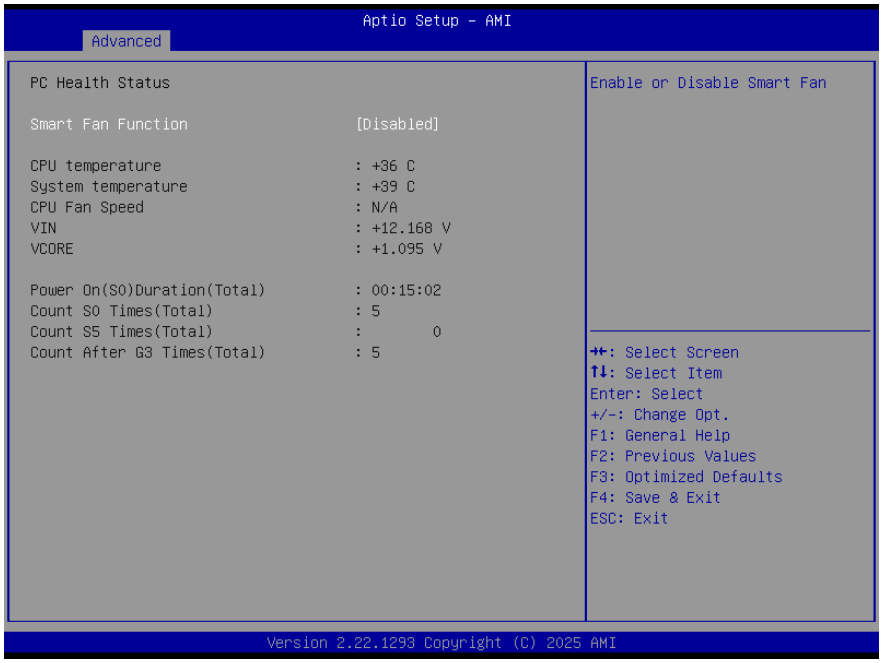
Item	Option	Description
Serial Port	Enabled**[Default]**, Disabled	Enable or Disable Serial Port (COM).

4.6.2.11.4 Serial Port 4 Configuration



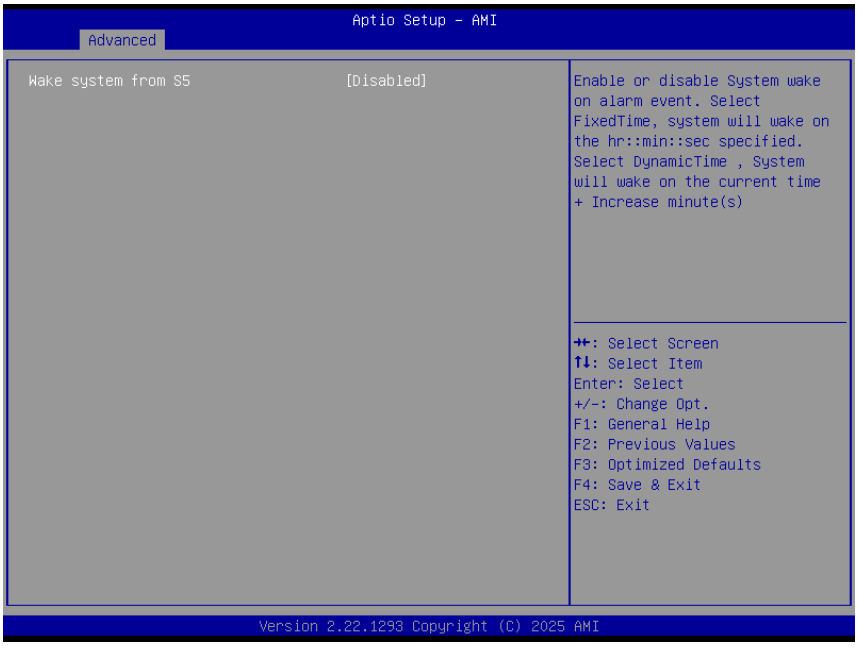
Item	Option	Description
Serial Port	Enabled**[Default]**, Disabled	Enable or Disable Serial Port (COM).

4.6.2.12 EC 5782 HW Monitor



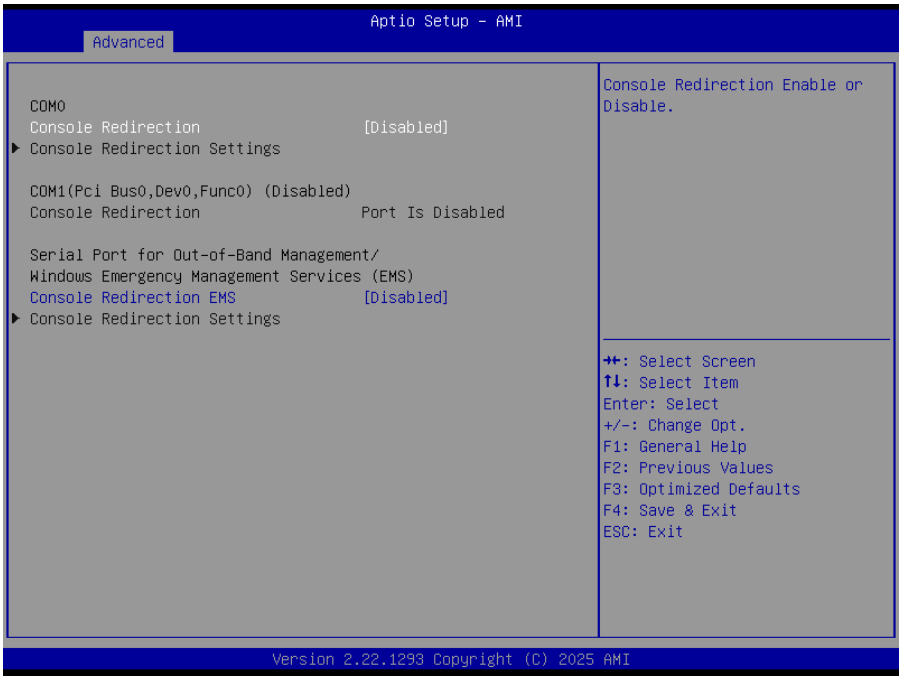
Item	Options	Description
Smart Fan Function	Enabled, Disabled**[Default]**	Enables or Disables Smart Fan.

4.6.2.13 S5 RTC Wake Settings



Item	Options	Description
Wake system from S5	Disabled**[Default]**, Fixed Time Dynamic Time	Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified. Select Dynamic Time, System will wake on the current time + Increase minute(s).

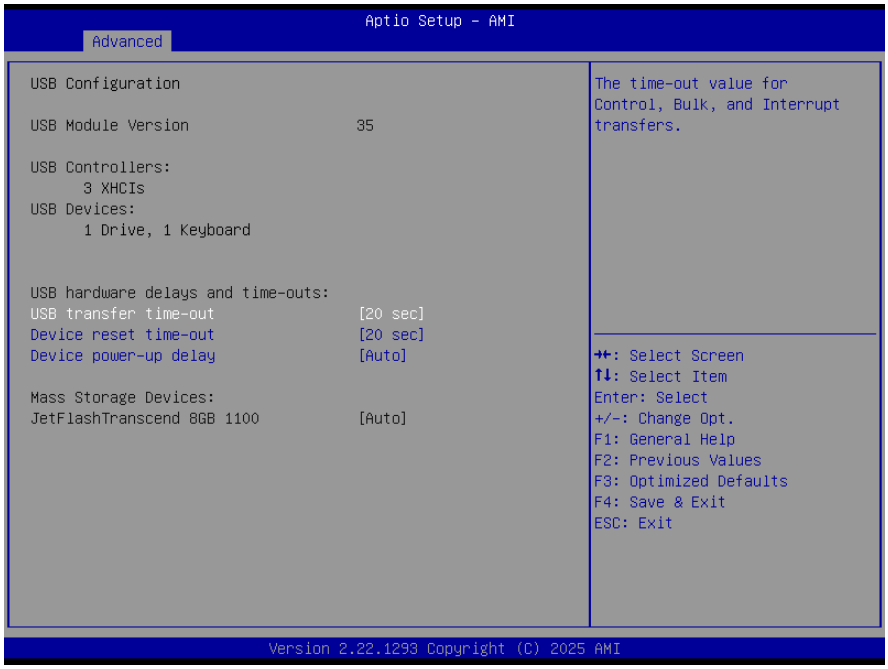
4.6.2.14 Serial Port Console Redirection



Item	Options	Description
Console Redirection	Disabled**[Default]**, Enabled	Console Redirection Enable or Disable.
Console Redirection EMS	Disabled**[Default]**, Enabled	Console Redirection Enable or Disable.

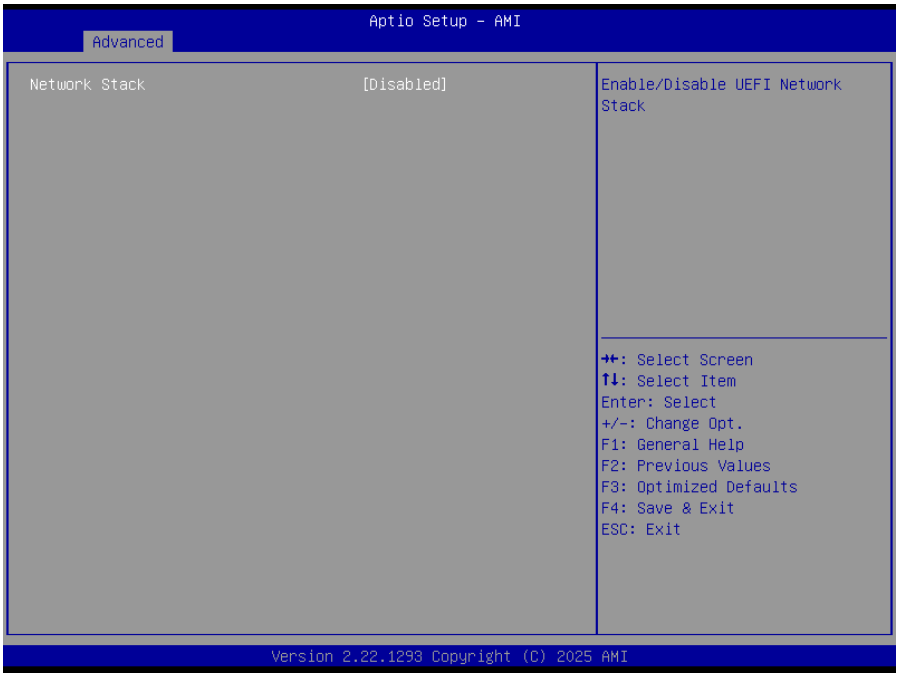
4.6.2.15 USB Configuration

The USB Configuration menu helps read USB information and configures USB settings.



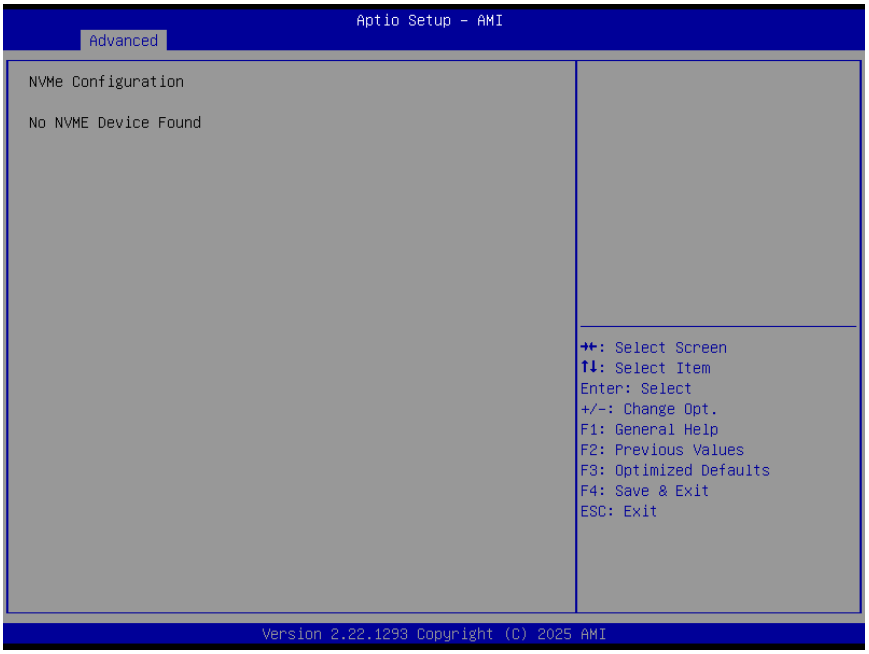
Item	Options	Description
USB transfer time-out	1 sec 5 sec 10 sec 20 sec**[Default]**	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec 20 sec**[Default]** 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	Auto**[Default]** Manual	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken form Hub descriptor.

4.6.2.16 Network Stack Configuration



Item	Options	Description
Network Stack	Enabled Disabled**[Default]**	Enable/Disable UEFI Network Stack.

4.6.2.17 NVMe Configuration



4.6.3 Security



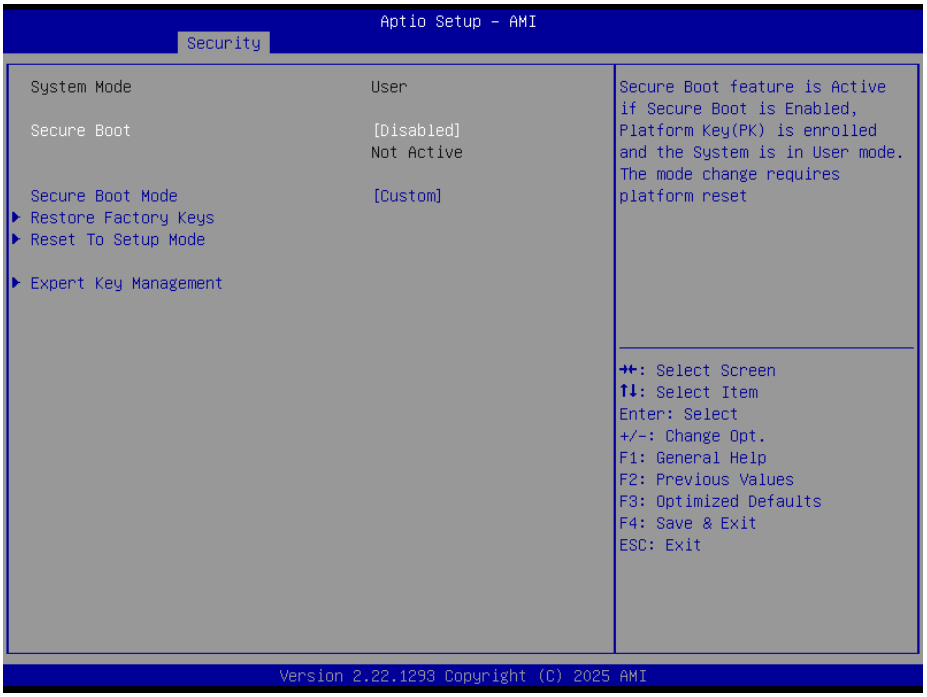
- **Administrator Password**

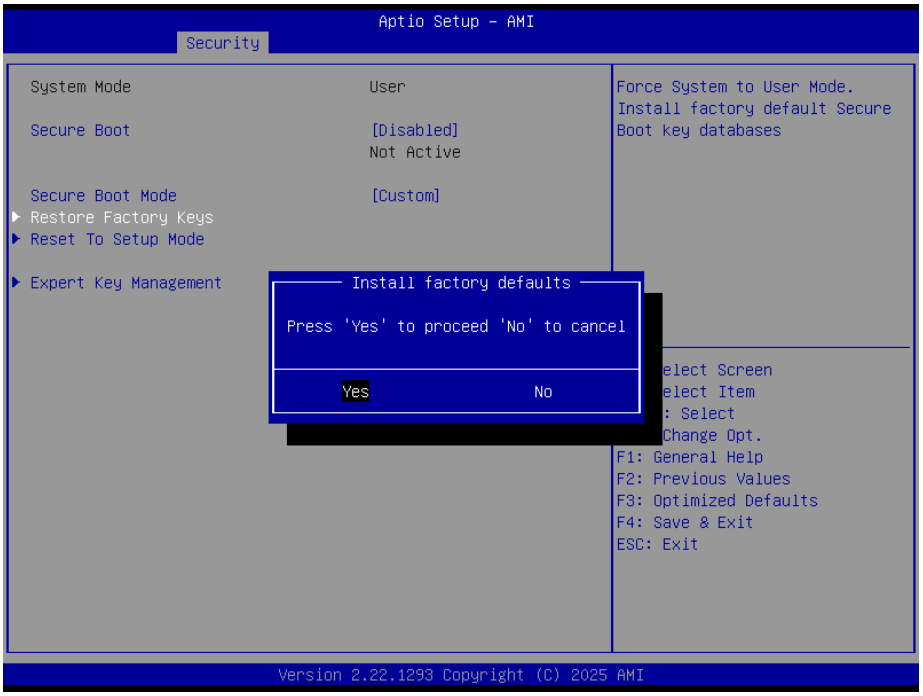
Set setup Administrator Password

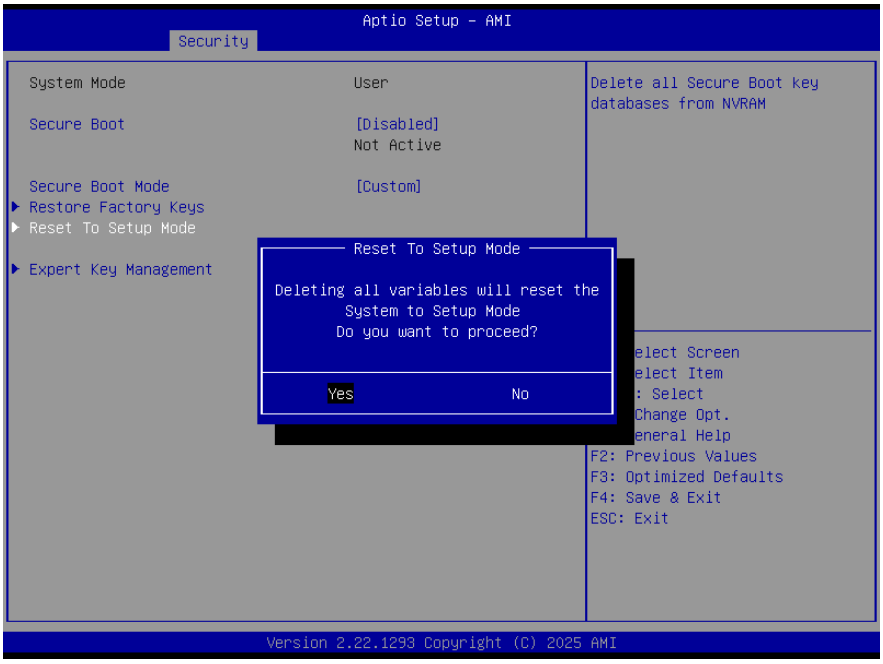
- **User Password**

Set User Password

4.6.3.1 Secure Boot

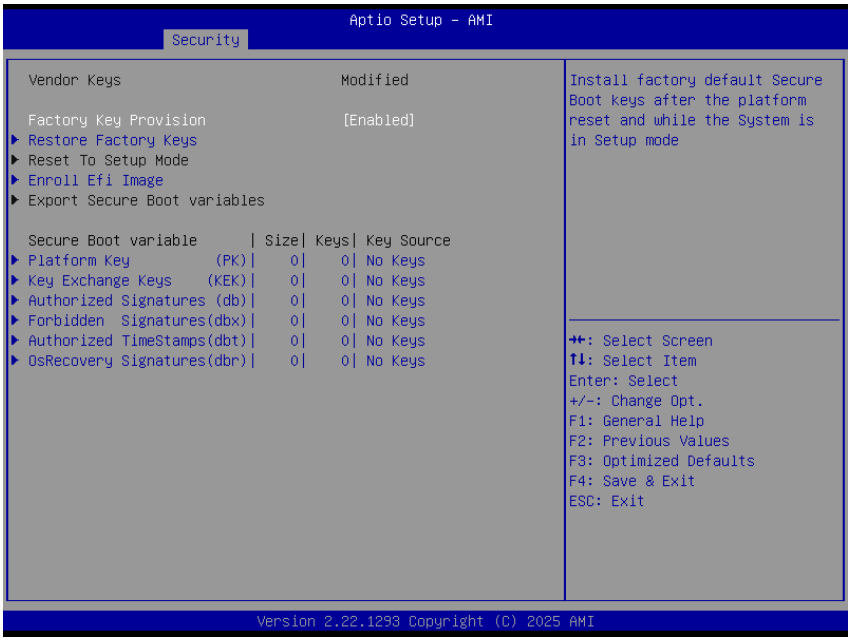






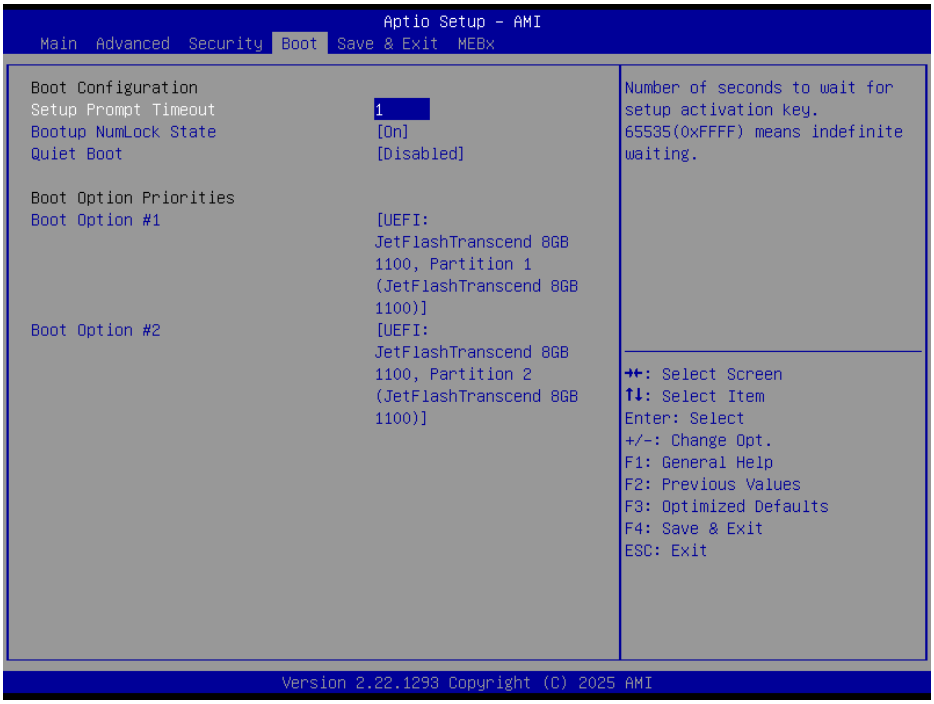
Item	Option	Description
Secure Boot	Disabled**[Default]** Enabled	Secure Boot feature is Active if Secure Boot is Enable, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset.
Secure Boot Mode	Standard Custom**[Default]**	Secure Boot mode selector: Standard/Custom. In Custom mode Secure Boot Variables can be configured without authentication.

4.6.3.1.1 Key Management



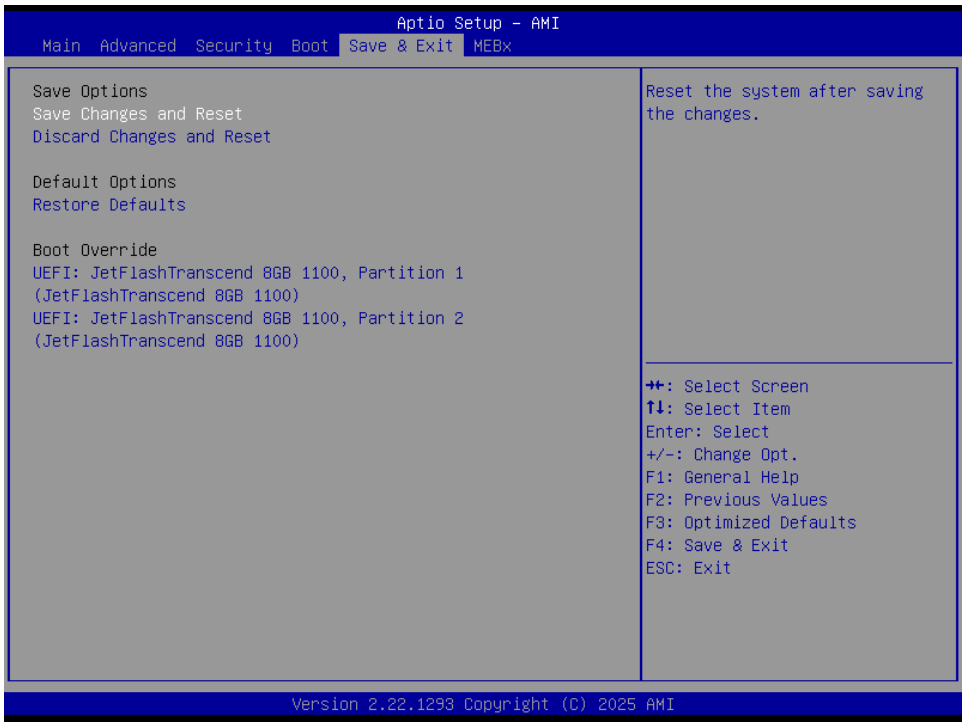
Item	Option	Description
Factory Key Provision	Disabled Enabled**[Default]**	Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode.

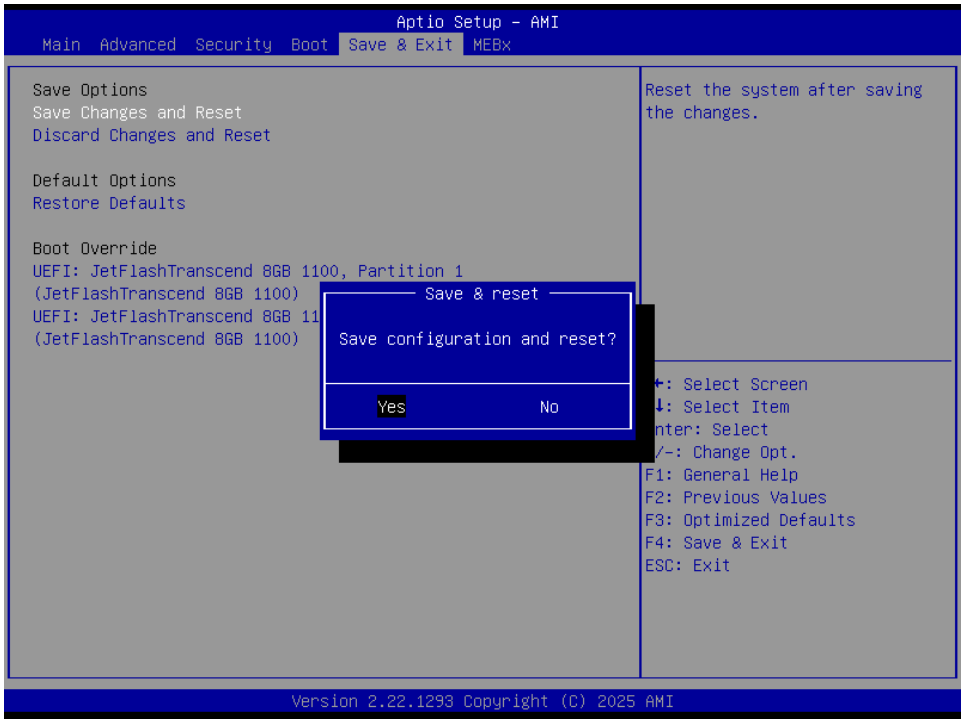
4.6.4 Boot



Item	Option	Description
Setup Prompt Timeout	1~ 65535	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On**[Default]** Off	Select the keyboard NumLock state
Quiet Boot	Disabled**[Default]** Enabled	Enables or disables Quiet Boot option
Boot Option #1/2	Set the system boot order.	

4.6.5 Save and Exit





4.6.5.1 Save Changes and Reset

Reset the system after saving the changes.

4.6.5.2 Discard Changes and Reset

Any changes made to BIOS settings during this session of the BIOS setup program are discarded. The setup program then exits and reboots the controller.

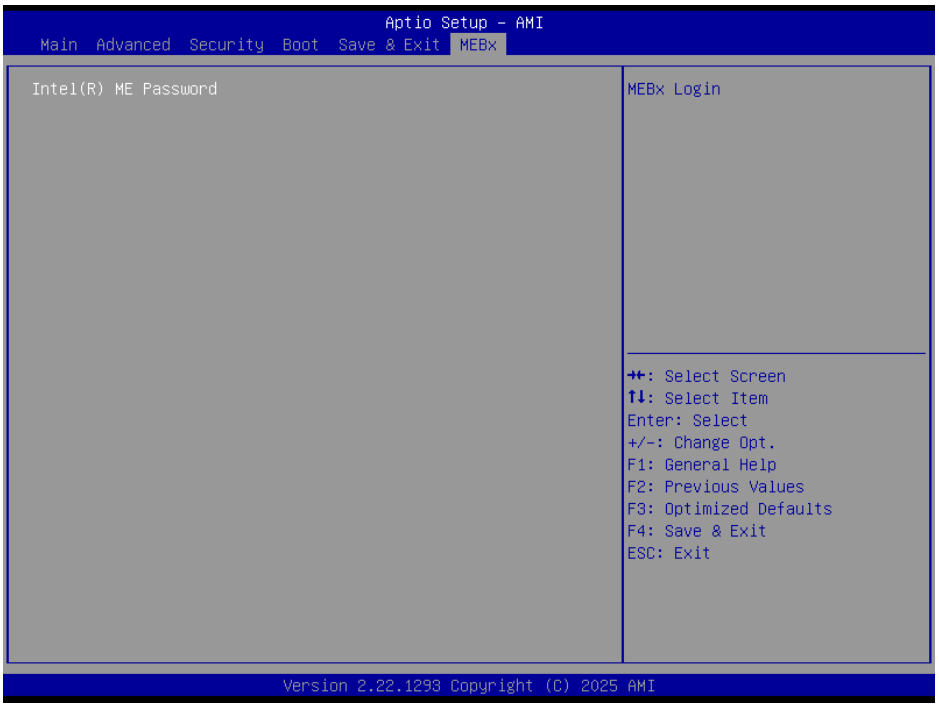
4.6.5.3 Restore Defaults

This option restores all BIOS settings to the factory default. This option is useful if the controller exhibits unpredictable behavior due to an incorrect or inappropriate BIOS setting.

4.6.5.4 Launch EFI Shell from filesystem device

Attempts to Launch EFI Shell application (Shellx64.efi) from one of the available filesystem devices.

4.6.6 MEBx

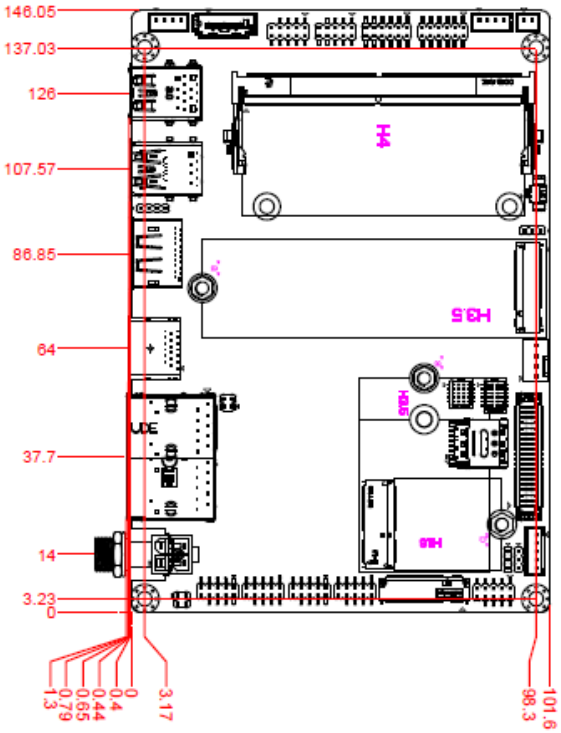


- **Intel® ME Password**

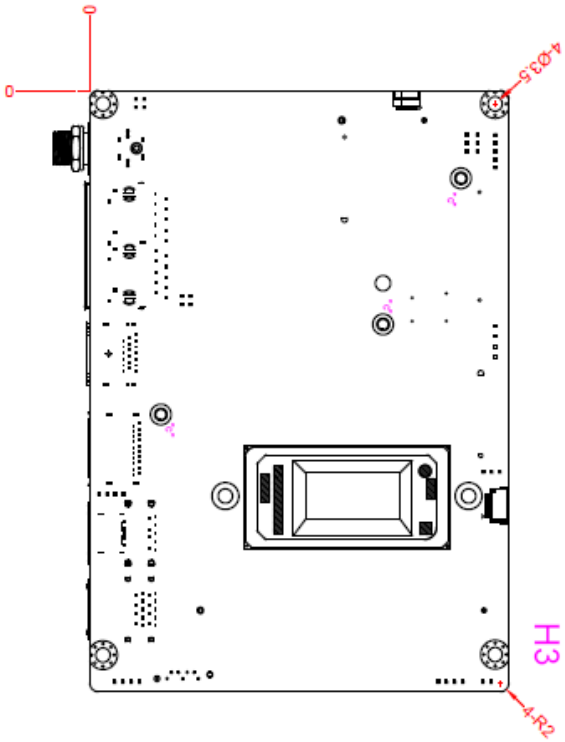
MEBx Login

5. Mechanical Drawing



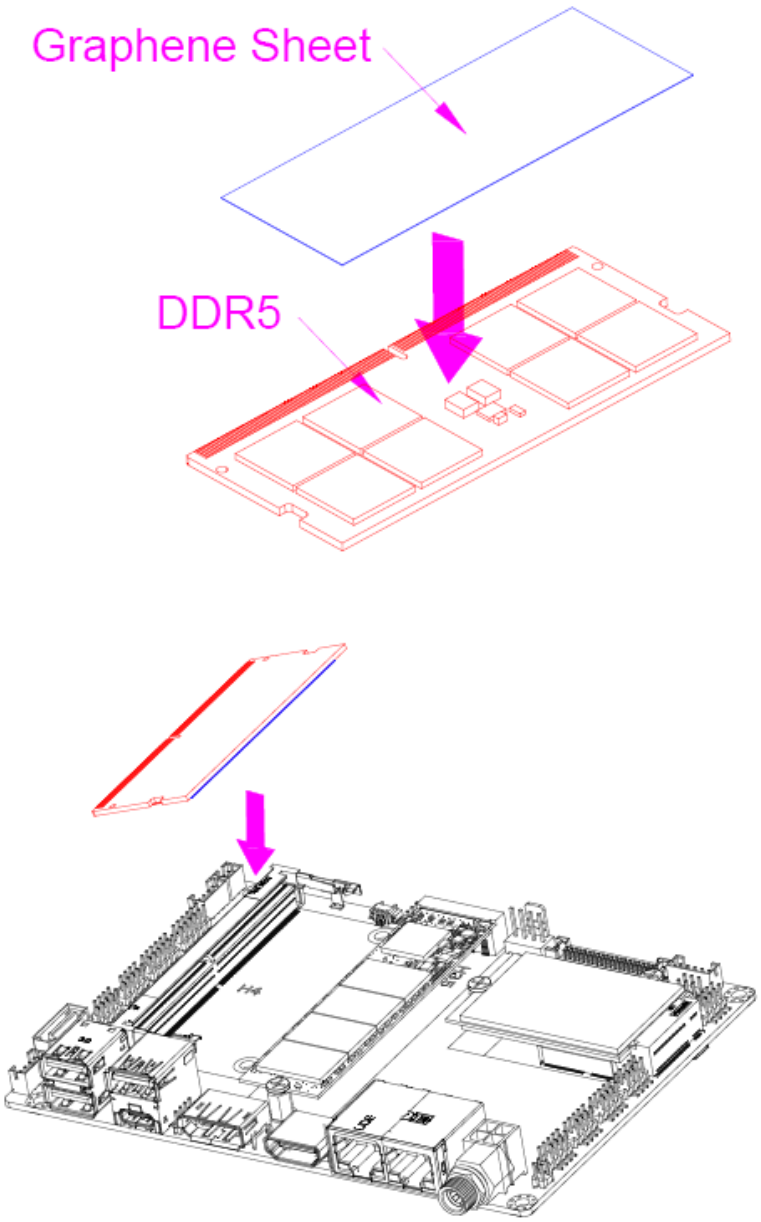

146.05
137.03
126
107.57
86.85
64
37.7
14
3.23
0
1.3
0.79
0.65
0.44
0.4
0
3.17
98.3
101.6
H4
H3.5
H5
H6
VDE




0
0
4-Ø3.5
H3
4-R2

Unit: mm

User may find the Graphene sheet in package, if need to apply on DDR5 SO-DIMM:



6. Maintenance & Troubleshooting

System Maintenance Introduction

If the components of the product fail they must be replaced.

Please contact the system reseller or vendor to purchase the replacement parts. Please follow the safety precautions outlined in the sections that follow

General Safety Precautions

Please ensure the following safety precautions are adhered to at all times.

1. Follow the electrostatic precautions outlined below whenever the device is opened.
2. Make sure the power is turned off and the power cord is disconnected whenever the product is being installed, moved or modified.
3. To prevent the risk of electric shock, make sure power cord is unplugged from wall socket. To fully disengage the power to the unit, please disconnect the power cord from the AC outlet. Refer servicing to qualified service personnel. The AC outlet shall be readily available and accessible.
4. Do not apply voltage levels that exceed the specified voltage range. Doing so may cause fire and/or an electrical shock. Use a power cord that matches the voltage of the power outlet, which has been approved and complies with the safety standard of your particular country.
5. Electric shocks can occur if the product chassis is opened when it is running. To avoid risk of electric shock, this device must only be connected to a supply mains with protective earth.
6. Do not drop or insert any objects into the ventilation openings of the product.
7. If considerable amounts of dust, water, or fluids enter the device, turn off the power supply immediately, unplug the power cord, and contact your dealer or the nearest service center.
8. This equipment is not suitable for use in locations where children are likely to be present.
9. DO NOT:

- Drop the device.
- In a site where the ambient temperature exceeds the rated temperature.

Anti-Static Precautions

WARNING:
Failure to take ESD precautions during the installation of the product may result in permanent damage to the product and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the product. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the product is opened and any of the electrical components are handled, the following anti-static precautions are strictly adhered to.

- Wear an anti-static wristband: Wearing a simple anti-static wristband can help to prevent ESD from damaging any electrical component.
- Self-grounding: Before handling any electrical component, touch any grounded conducting material. During the time the electrical component is handled, frequently touch any conducting materials that are connected to the ground.
- Use an anti-static pad: When configuring or working with an electrical component, place it on an anti-static pad. This reduces the possibility of ESD damage.
- Only handle the edges of the electrical component. When handling the electrical component, hold the electrical component by its edges. Please ensure the following safety precautions are adhered to at all times.

Maintenance and Cleaning

When maintaining or cleaning the product, please follow the guidelines below.

WARNING:

- For safety reasons, turn-off the power and unplug the PC before cleaning.
- If you dropped any material or liquid such as water onto the PC when cleaning, unplug the power cable immediately and contact your dealer or the nearest service center. Always make sure your hands are dry when unplugging the power cable.

Maintenance and Cleaning

Prior to cleaning any part or component of the product, please read the details below.

- Never spray or squirt liquids directly onto any other components.
- The interior of the device does not require cleaning. Keep fluids away from the device interior.
- Be cautious of all small removable components when vacuuming the device.
- Never drop any objects or liquids through the openings of the device.
- Be cautious of any possible allergic reactions to solvents or chemicals used when cleaning the device.
- Avoid eating, drinking and smoking within vicinity of the device.

Basic Troubleshooting

PEI Beep Codes

# of Beeps	Description
1	Memory not Installed
2	Recovery started
3	Typically for development use. The beep code is generated when DXEIPL PPI or DXE Core is not found.
4	Recovery failed
4	S3 Resume failed
7	Typically for development use. The beep code is generated when platform cannot be reset because reset PPI is not available.

DXE Beep Codes

# of Beeps	Description
1	Invalid password
4	Typically for development use. The beep code is generated when some of the Architectural Protocols are not available.
5	No Console Input or Output Devices are found
5	No Console Input Devices are found
6	Flash update is failed
7	Typically for development use. The beep code is generated when platform cannot be reset because reset protocol is not available.
8	Platform PCI resource requirements cannot be met

